

April 2, 2024

**Request for Bids
Lansing School District
Purchasing Department
519 West Kalamazoo
Lansing, MI 48933**

This is not an order

Sealed proposals for the furnishing of items and services listed on the sheets attached to the bid proposal documents that are available on our web-site will be received in the Lansing School District Purchasing Office, 519 W. Kalamazoo St., Lansing, Michigan 48933 until

April 18, 2024, 2:00 PM local time.

At this time and place bids will be opened publicly and read aloud.

One (1) original and Two (2) copies of the bid are to be submitted on the forms furnished by the Lansing School District in a sealed envelope and clearly marked:

Bid SO-1803 Newcomers Center Renovations

BID DOCUMENTS WILL BE POSTED BY April 8, 2024

To obtain a copy of this request for bid please visit our web site at:

www.lansingschools.net

(Click on Quicklinks at the top and click on Vendors (Bid Info), scroll down to Current Requests for Bids or Proposals) or the bid documents are also posted on the State of Michigan's procurement system SIGMA. If you need assistance, please contact the Lansing School District Purchasing Department at 517-755-3030.

No faxed, telephone or e-mailed bids will be accepted. Late submittals will not be considered.

All questions must be in writing and should be directed to Jon Laing, Chief Financial Officer at:

Projects@lansingschools.net, no later than 2:00 PM on Friday, April 12, 2024. Addendums will be posted on the Lansing School District's web-site and SIGMA as they are issued.

All bids/proposals must be accompanied by a 5% bid bond and a sworn and notarized statement disclosing any familial relationship with the Board of Education and selected staff. Bids must include the completed statement to be accepted or considered.

All bids shall be submitted in accordance with the attached instructions and shall remain firm for a period of ninety (90) days after the opening of bids.

A bid bond is required with this bid in the amount of 5% of the total bid amount. Certified payrolls are required with each invoice or pay application. A performance, labor and materials bond will be required to cover 100% of the project.

The Lansing School District reserves the right to reject any or all bids in whole or in part and to accept the proposal or portion of the proposal that, in their opinion, best serves the interests of the Lansing School District.

Lansing School District

Jon Laing
Chief Financial Officer

PRE-BID INFORMATION

There will be a Pre-Bid Meeting held Wednesday, April 10, 2024 at 1:30 PM at NewComers Center, 301 W Jolly Rd. Lansing, MI 48911. Attendance is HIGHLY RECOMMENDED.



Lansing School District Newcomer Center Remodeling

AE Project 2616.04

CM Project 24019

LSD SO Project 1803

**301 W. Jolly Road
Lansing, MI 48910**

Bid Package 1

April 5, 2024

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Sample Work Order/Purchase Order
A201-2017 (For Reference)



DOCUMENT 00 11 00 - ADVERTISEMENT FOR BIDS

1.1 GENERAL

A. Construction Manager Contact Information

Bidding: estimating@lauxconstruction.com

Project Manager: Chais VanDeventer
517-694-0117
chais@lauxconstruction.com

Assistant PM: Derek Walkington
517-694-0117
derek@lauxconstruction.com

B. Instructions to Bidders: See below.

C. Bid Basis: Bids must be on stipulated sum basis.

D. Receipt of Bids: Construction Manager will receive bids until **2:00 PM (ET) Thursday, April 18, 2024** at the Lansing School District Offices located at 519 W. Kalamazoo Lansing, MI.

E. Bid Opening: Bids will be opened publicly shortly after the bid submission deadline at the LSD Offices Board Room. Please note that only attendees at the public opening will receive bid results. Bid results will NOT be released to anyone not attending the in-person public bid opening.

F. Bid Security: Five (5%) percent of highest possible Bid amount is required to be submitted with each bid. Bid security can be in the form of a bid bond or cashier's check.

G. Irrevocability: Bids may not be withdrawn for period of 30 days after submittal.

1.2 INSTRUCTIONS TO BIDDERS

A. Laux Construction/Lansing School District is accepting bids for multiple work categories associated with the interior renovations of North Elementary.

B. Bidders are to submit **THREE (3) HARD COPIES** of their bid submission in a sealed envelope addressed to Lansing School District 519 W. Kalamazoo Lansing, MI 48933. Please note "Newcomer Center Remodeling—Work Category ____" on the outside of the envelope. Please mark "ORIGINAL" on one copy and "COPY" on the other two copies of the bid submission.

C. Bids are to be hand-delivered or mailed so that they are received no later than **2:00 pm (ET) on Thursday, April 18, 2024.**



- D. Bidders are to include the following in their bid submission:
1. Completed and signed bid form.
 2. Bid Security (5%)
 3. Supplier/Vendor Application
 4. Commodity List
 5. Affidavit of Bidder (Familial Disclosure)
 6. Non-Discrimination in Employment Certification
 7. Affidavit of Bidder (Non-Collusion)
 8. Iran Economic Sanctions Act Certificate
 9. Legal Status of Bidder
- E. Bid security (bid bond or cashier's check) in the amount of 5% of the bid amount will be required with all bid submission.
- F. Successful bidders **may** be required to provide 100% performance and payment bonds. Do NOT include the cost of performance bonds in your bid. A line has been provided on the bid form to indicate the additional cost for the bonds should they be required by the CM.
- G. Prevailing wages/certified payroll will **NOT** be required for this project.
- H. Any allowances listed in Price and Payment Procedures section/WC descriptions are to be included in the base bid amount for the respective WC's.
- I. Laux Construction will obtain the general building permit. MEP trades will be responsible for their respective permit and associated fees. All permits are to be obtained from State of Michigan Bureau of Construction Codes.
- J. Bidders are to review the entire set of documents and familiarize themselves with all work category descriptions.
- K. Post bid interviews will be held by the construction manager/LSD/Kingscott on April 22 and 23 at times TBD for the apparent low two bidders from each work category. Interviews will be conducted with a virtual, online meeting via Zoom. Links to these meetings will be provided by the construction manager.
- L. Questions are to be submitted in writing to the Lansing School District via email to projects@lansingschools.net no later than **2:00 pm on Friday, April 12, 2024**. Please cc Laux Construction on these emails at estimating@lauxconstruction.com



1.3 BIDDING DOCUMENTS

A. Bidders may obtain documents in Adobe PDF format from the following sources:

1. Submit written request to the construction manager via email to estimating@lauxconstruction.com
A link will be provided via Procore.
2. At the website of Lansing School District www.lansingschools.net
3. State of Michigan SIGMA Vendor Self Service website.
4. Builders Exchange of Lansing www.bxlansing.com
5. Builders Exchange of Michigan www.grbx.com
6. Kalamazoo Builders Exchange www.builder-exchange.com

1.4 BIDDER QUALIFICATIONS/OWNER ACCEPTANCE

- A. Bidder may be required to submit a qualification statement, including financial records upon request of the construction manager.
- B. It is the owner's intent to accept the lowest, most responsible bidder; however, Lansing District reserves the right to accept or reject any and all bids that are in the best interest of the district.

1.5 PRE-BID CONFERENCE

- A. Pre-bid conference will be held at **3:00 pm local time on Wednesday, April 10, 2024** at the project site, located at 301 West Jolly rd. Lansing, MI 48911.
- B. Bidders and sub-bidders are invited to attend. Attendance is not mandatory, but highly recommended. Bidders will be responsible for any existing site conditions that are visible during the walkthrough.
- C. Representatives of Construction Manager, Lansing School District, and Kingscott will be in attendance.

1.6 EXAMINATION OF PROJECT SITE

- A. Examination of the site will be conducted immediately following the pre-bid conference.

1.7 FORM OF TRADE CONTRACTOR/VENDOR AGREEMENT

- A. A subcontractor agreement will be issued by Laux Construction (trade contractors). Suppliers will receive a purchase order agreement. See attached examples.

1.8 ALTERNATES AND ALLOWANCES

Refer to Section 01 20 00.01 Price and Payment Procedures for required alternates and allowances.

END OF DOCUMENT



DOCUMENT 00 30 00 - AVAILABLE PROJECT INFORMATION

1.1 Documents

- A. Project manual by Laux Construction, dated April 5, 2024.
- B. Drawings by Kingscott, dated March 22, 2024.
- C. Technical specifications by Kingscott, dated March 22, 2024.

END OF DOCUMENT



DOCUMENT 00 41 00 - BID FORM

DATE _____

PROJECT **Newcomer Center Remodeling
Bid Package #1**

OWNER Lansing School District

DESIGN PROFESSIONAL Kingscott

BIDDER _____

WORK CATEGORY _____

1.1 ACKNOWLEDGEMENTS

- A. Bidder accepts the provisions of Bidding Documents.
- B. Bidder will enter into a contract with the Construction Manager for this work within 10 days after notification of acceptance of this Bid.
- C. Bidder will complete the Work in accordance with the Bidding Documents prepared by Bergmann/Laux Construction.
- D. Bidder has received the following Addenda:

No. _____ Dated _____, 20__

No. _____ Dated _____, 20__

No. _____ Dated _____, 20__

No. _____ Dated _____, 20__

No. _____ Dated _____, 20__

1.2 BID SUMS

A. Base Bid: Bidder will complete the Project for stipulated sum of: \$ _____

Dollars and 00/100-----

B. Not Used



C. Alternate Bids:

- **Work Category 07A- Siding/Fascia/Soffit/Gutter & Downspout**

Alternate #1-Install new vinyl siding, corners and j-channel.

Add to Base Bid \$_____

Alternate #2-Remove and replace selected existing aluminum siding and accessories

Add to Base Bid \$_____

D. Unit Prices:

- **Work Category 03A – Concrete/Sitework**

Square foot cost to grade and seed site.

\$_____ /sf

- **Work Category 07A—Siding/Fascia/Soffit/Gutter & Down Spout**

Lineal foot cost to replace aluminum siding

\$_____ /lf

Lineal foot cost to replace aluminum fascia

\$_____ /lf

Square foot cost to replace perforated aluminum soffit

\$_____ /sft

- **Work Category 9B-Floor Coverings**

Square foot cost to add 1/8" floor leveling product in areas receiving new flooring

\$_____ /sft

- **Work Category 26A—Electrical**

Lineal foot cost to add/delete conduit support from the 500 lf that is to be included in the base bid of this work category.

\$_____ /lf



- **Work Category 28A—Technology**

Lineal foot cost to add/delete conduit support from the 500 lf that is to be included in the base bid of this work category.

\$ _____ /lf

1.3 TIME FOR PERFORMANCE OF WORK

- A. All work is to be completed in order for the school to be occupied and operational no later than August 23, 2024

Submitted by:

Firm Name _____

By _____

Street Address _____

Signature _____

City, State and Zip Code _____

Title _____

Telephone _____

Bidder is a (corporation) (partnership) (sole proprietorship) (Bidder strike out inapplicable terms)

Corporations affix Corporate Seal

State in which incorporated _____

END OF DOCUMENT

LANSING SCHOOL DISTRICT
 PURCHASING DEPARTMENT
 519 W. KALAMAZOO ST., ROOM 200
 LANSING MI 48933
 (517) 755-3030
 FAX (517) 755-3019

SUPPLIER/VENDOR APPLICATION
 (Please type or print)

PURFR016 – 7/7/08 – Version 5

MARK ONE:
 New Application
 Update

Date: _____

W-9 form attached? YES NO

DUN & BRADSTREET RATING (if available)

NAME OF COMPANY	FEDERAL ID NUMBER (OR) SOCIAL SECURITY NUMBER	
Submit copy of W-9 form with application		
ADDRESS TO WHICH BIDDING FORMS AND PURCHASE ORDERS ARE TO BE MAILED – STREET NO., CITY, STATE, ZIP CODE		
ADDRESS TO WHICH PAYMENTS ARE TO BE MAILED – STREET NO., CITY, STATE, ZIP CODE		
PARENT COMPANY AND ADDITIONAL OFFICE LOCATIONS IN MICHIGAN (May attach separate sheet)		
E-MAIL ADDRESS: For Purchase orders to be emailed	WEB SITE:	
TYPE OF ORGANIZATION <input type="checkbox"/> Individual <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation	TELEPHONE #: _____ FACSIMILIE #: _____	
PERSONS TO CONTACT AND THOSE AUTHORIZED TO SIGN BIDS AND CONTRACTS IN YOUR NAME (if agent, so specify)		
Name	Official Capacity	Telephone No.
PLEASE LIST ON THE REVERSE SIDE CLASSES OF EQUIPMENT, SUPPLIES, MATERIALS, AND/OR SERVICES ON WHICH YOU DESIRE TO BID.		
<input type="checkbox"/> Do you require a hard copy of verbal orders? Yes ___ No ___ Do you accept Procurement Cards? Yes ___ No ___ <input type="checkbox"/> Electronic Disk Catalog <input type="checkbox"/> Electronic Ordering		
Please complete the following:		
STANDARD PAYMENT TERMS: _____ PROMPT PAY DISCOUNT: _____ STANDARD DELIVERY TIME: _____		
PLEASE COMPLETE BELOW		
Please list percentage and circle category that applies:		
MINORITY OWNED: _____% Native-American Asian-Pacific American African-American Hispanic-American Asian-Indian American		
WOMEN OWNED: _____% White Native-American Asian-Pacific American African-American Hispanic-American Asian-Indian American		
DISABLED: _____% SMALL BUSINESS: Yes _____ No _____ Business located within LANSING SCHOOL District Yes _____ No _____		
Are you certified? If so, list agencies		Certificate Number:
_____	_____	_____
_____	_____	_____
SIGNATURE OF PERSON AUTHORIZED TO SIGN THIS APPLICATION		

NAME AND TITLE OF PERSON SIGNING (Please type or print)		

COMMODITY LIST

Please place a checkmark (✓) by the appropriate code and provide a detailed description of the commodities and/or services offered. If the complete NAICS Code is known please include this number in the description area.
Website URL address for NAICS is: <http://www.census.gov/epcd/www/naics.html>

<i>NAICS CODE</i>	<i>DESCRIPTION</i>
___ 11 – Agriculture, Forestry, Fishing and Hunting	_____
___ 21 – Mining	_____
___ 22 – Utilities	_____
___ 23 – Construction	_____
___ 31-33 – Manufacturing	_____
___ 42 – Wholesale Trade	_____
___ 44-45 – Retail Trade	_____
___ 48-49 – Transportation and Warehousing	_____
___ 51 – Information	_____
___ 52 – Finance and Insurance	_____
___ 53 – Real Estate and Rental and Leasing	_____
___ 54 – Professional, Scientific and Technical Services	_____
___ 55 – Management of Companies and Enterprises	_____
___ 56 – Administrative & Support, Waste Management & Remediation Services	_____
___ 61 – Educational Services	_____
___ 62 – Health Care and Social Assistance	_____
___ 71 – Arts, Entertainment and Recreation	_____
___ 72 – Accommodation and Foodservices	_____
___ 81 – Other Services (except Public Administration)	_____
___ 92 – Public Administration	_____
___ 99 – Unclassified Establishments	_____

CATEGORY (Check below the category which applies to the applicant)
 (A) Manufacturer or Producer (B) Wholesaler (C) Retailer (D) Mfgr's Agent (E) Distributor
 (F) Service Establishment



Committed to Quality

STATEMENT OF NO BID

NOTE: IF YOU DO NOT INTEND TO BID, PLEASE RETURN THIS FORM ONLY TO:

Lansing School District
519 W KALAMAZOO ST
LANSING, MI 48933

BID NO: # _____

PHONE: 517-755-3030
FAX: 517-755-3019

We, the undersigned, have declined to bid on the above noted bid for the following reasons:

_____ Insufficient time to respond to the invitation to Bid.

_____ Request for Proposal is unclear.

_____ Do not offer this product or service.

_____ Our schedule will not permit us to perform.

_____ Unable to meet the specifications

_____ Specifications are unclear (Please explain below)

_____ Remove us from your Bidder Mailing List

_____ Other (Please specify below)

REMARKS:

Company Name: _____

Signature: _____

Date: _____ Telephone: _____ Fax: _____

AFFIDAVIT OF BIDDER

The undersigned, the owner or authorized officer of _____(the “Bidder), pursuant to the familial disclosure requirement provided in the _____(the “School District”) advertisement for construction bids, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of _____and any member of the Board of Education of the School District or the Superintendent of the School District.

List any Familial Relationships:

BIDDER:

By: _____

Its: _____

STATE OF MICHIGAN)
)ss.
COUNTY OF _____)

This instrument was acknowledged before me on the _____ day of _____, 20____, by
_____.

, Notary Public
_____ County, Michigan

My Commission Expires: _____

Acting in the County of: _____

NON-DISCRIMINATION IN EMPLOYMENT CERTIFICATION

Lansing School District Certificate of Intent to Comply with “NON-DISCRIMINATION IN EMPLOYMENT” POLICY

I have read Lansing School District’s Policy #3122, including paragraph #13 and hereby state my intent to comply with the terms and conditions contained therein. Further I agree to furnish the Michigan Civil Rights Commission with such data and records concerning employment as may be requested by that agency in determining compliance with the policy.

Print or type name of Contact Person:

Signed: _____

Title: _____

Company: _____

Date: _____



Book	Policy Manual
Section	3000 Professional Staff
Title	NONDISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY
Code	po3122
Status	Active
Adopted	November 1, 2016
Last Revised	March 8, 2021

3122 - **NONDISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY**

The Board of Education does not discriminate on the basis of race, color, national origin, sex, (including sexual orientation and transgender identity), disability, age, religion, height, weight, marital or family status, military status, ancestry, genetic information or any other legally protected category, (collectively, "Protected Classes"), in its programs and activities, including employment opportunities.

District Compliance Officers

The Board designates the following individuals to serve as the District's "Compliance Officers" (also known as "Civil Rights Coordinator") (hereinafter referred to as the "COs").

Samuel Sinicropi
 Superintendent
 519 W. Kalamazoo St.
 Lansing, MI 48933
 517-755-1010
 sam.sinicropi@lansingschools.net

The names, titles, and contact information of these individuals will be published annually:

- A. in the parent/student and staff handbooks.
- B. in the School District Annual Report to the public.
- C. on the School District's web site.
- D. on each individual school's web site.
- E. in all appropriate new hire documents.

The COs are responsible for coordinating the District's efforts to comply with applicable Federal and State laws and regulations, including the District's duty to address in a prompt and equitable manner any inquiries or complaints regarding discrimination, retaliation or denial of equal access. The COs shall also verify that proper notice of nondiscrimination for Title II, of the Americans with Disabilities Act (as amended), Title VI and Title VII of the Civil Rights Act of 1964, Title IX of the Education Amendment Act of 1972, and Section 504 of the Rehabilitation Act of 1973 (as amended), and the Age Discrimination in Employment Act of 1975 is provided to staff members, and the general public. Any sections of the District's collective bargaining agreements dealing with hiring, promotion, and tenure need to

contain a statement of nondiscrimination similar to that in the Board's statement above. In addition, any gender-specific terms should be eliminated from such contracts. A copy of each of the Acts and regulations on which this notice is based may be found in the CO's office.

Reports and Complaints of Unlawful Discrimination and Retaliation

Employees are encouraged to promptly report incidents of unlawful discrimination and/or retaliation to an administrator, supervisor, or other District-level official so that the Board may address the conduct. Any administrator, supervisor, or other District-level employee or official who receives such a complaint shall file it with the CO within two (2) school days.

Employees who believe they have been unlawfully discriminated/retaliated against are entitled to utilize the complaint process set forth below. Initiating a complaint, whether formally or informally, will not adversely affect the complaining individual's employment. While there are no time limits for initiating complaints under this policy, individuals should make every effort to file a complaint as soon as possible after the conduct occurs while the facts are known and potential witnesses are available.

The COs will be available during regular school/work hours to discuss concerns related to unlawful discrimination/retaliation. COs shall accept complaints of unlawful discrimination/retaliation directly from any member of the School District community or a visitor to the District, or receive complaints that are initially filed with a school building administrator. Upon receipt of a complaint, either directly or through a school building administrator, a CO will begin either an informal or formal process (depending on the request of the person alleging the discrimination/retaliation or the nature of the alleged discrimination/retaliation), or the CO will designate a specific individual to conduct such a process. The CO will provide a copy of this policy to any person who files a complaint. In the case of a formal complaint, the CO will prepare recommendations for the Superintendent or oversee the preparation of such recommendations by a designee. All members of the School District community must report incidents of discrimination/retaliation that are reported to them to the CO within two (2) business days of learning of the incident/conduct.

Any Board employee who directly observes unlawful discrimination/retaliation is obligated, in accordance with this policy, to report such observations to one of the COs within two (2) business days. Additionally, any Board employee who observes an act of unlawful discrimination/retaliation is expected to intervene to stop the misconduct, unless circumstances make such an intervention dangerous, in which case the staff member should immediately notify other Board employees and/or local law enforcement officials, as necessary, to stop the misconduct. Thereafter, the CO or designee must contact the employee within two (2) business days to advise him/her of the Board's intent to investigate the alleged wrongdoing.

Investigation and Complaint Procedure (See Form 3122 F2)

Any employee who believes that s/he has been subjected to unlawful discrimination or retaliation may seek resolution of his/her complaint through the procedures described below. The formal complaint procedures involve an investigation of the individual's claims and a process for rendering a decision regarding whether the charges are substantiated.

Due to the sensitivity surrounding complaints of unlawful discrimination or retaliation, timelines are flexible for initiating the complaint process; however, individuals should make every effort to file a complaint within thirty (30) calendar days after the conduct occurs. Once the formal complaint process is begun, the investigation will be completed in a timely manner (ordinarily, within fifteen (15) business days of the complaint being received).

The procedures set forth below are not intended to interfere with the rights of any individual to pursue a complaint of unlawful discrimination or retaliation with the United States Department of Education Office for Civil Rights or Equal Employment Opportunity Commission ("EEOC").

Informal Complaint Procedure

The goal of the informal complaint procedure is to quickly stop inappropriate behavior and facilitate resolution through an informal means, if possible. The informal complaint procedure is provided as a less formal option for an employee who believes s/he has been unlawfully discriminated or retaliated against. This informal procedure is not required as a precursor to the filing of a formal complaint. The informal process is only available in those circumstances where the parties (the alleged target of the discrimination/retaliation and individual(s) alleged to have engaged in the discrimination) agree to participate in it.

Employees who believe that they have been unlawfully discriminated/retaliated against may proceed immediately to the formal complaint process and individuals who seek resolution through the informal procedure may request that the informal process be terminated at any time to move to the formal complaint process.

All complaints involving a District employee or any other adult member of the School District community against a student will be formally investigated.

As an initial course of action, if an individual feels that s/he is being unlawfully discriminated/retaliated against and s/he is able and feels safe doing so, the individual should tell or otherwise inform the person who engaged in the allegedly discriminatory/retaliatory conduct that it is inappropriate and must stop. The complaining individual should address the alleged misconduct as soon after it occurs as possible. The COs are available to support and counsel individuals when taking this initial step or to intervene on behalf of the individual if requested to do so. An individual who is uncomfortable or unwilling to inform the person who allegedly engaged in the unlawful misconduct of his/her concerns is not prohibited from otherwise filing an informal or a formal complaint. In addition, with regard to certain types of unlawful discrimination, such as sexual discrimination, the CO may advise against the use of the informal complaint process.

An individual who believes s/he has been unlawfully discriminated/retaliated against may make an informal complaint, either orally or in writing: (1) to a building administrator; (2) directly to one of the COs; and/or (3) to the Superintendent or other District-level employee.

All informal complaints must be reported to one of the COs who will either facilitate an informal resolution as described below, or appoint another individual to facilitate an informal resolution.

The School District's informal complaint procedure is designed to provide employees who believe they are being unlawfully discriminated/retaliated against with a range of options aimed at bringing about a prompt resolution of their concerns. Depending upon the nature of the complaint and the wishes of the individual claiming unlawful discrimination/retaliation, informal resolution may involve, but not be limited to, one or more of the following:

- A. Advising the individual about how to communicate his/her concern to the person who allegedly engaged in the discriminatory/retaliatory behavior.
- B. Distributing a copy of Policy 3122 – Non-Discrimination as a reminder to the individuals in the school building or office where the individual whose behavior is being questioned works.
- C. If both parties agree, the CO may arrange and facilitate a meeting between the individual claiming discrimination/retaliation and the individual accused of engaging in the misconduct to work out a mutual resolution.

While there are no set time limits within which an informal complaint must be resolved, the CO or designee will exercise his/her authority to attempt to resolve all informal complaints within fifteen (15) business days of receiving the informal complaint. Parties who are dissatisfied with the results of the informal complaint process may proceed to file a formal complaint. And, as stated above, parties may request that the informal process be terminated at any time to move to the formal complaint process.

Formal Complaint Procedure

If a complaint is not resolved through the informal complaint process, if one of the parties requested that the informal complaint process be terminated to move to the formal complaint process, or if the individual elects to file a formal complaint initially, the formal complaint process shall be implemented.

An individual who believes s/he has been subjected to unlawful discrimination/retaliation (hereinafter referred to as the "Complainant"), may file a formal complaint, either orally or in writing, with a Principal, the CO, Superintendent, or other District-level employee. Due to the sensitivity surrounding complaints of unlawful discrimination and retaliation, timelines are flexible for initiating the complaint process; however, individuals should make every effort to file a complaint within thirty (30) calendar days after the conduct occurs. If a Complainant informs a Principal, Superintendent, or other District-level employee, either orally or in writing, about any complaint of discrimination or retaliation, that employee must report such information to the CO within two (2) business days.

Throughout the course of the process, the CO should keep the parties informed of the status of the investigation and the decision-making process.

All formal complaints must include the following information to the extent it is available: the identity of the individual believed to have engaged in, or be engaging in; the discriminatory/retaliatory conduct; a detailed description of the facts upon which the complaint is based; a list of potential witnesses; and the resolution sought by the Complainant.

If the Complainant is unwilling or unable to provide a written statement including the information set forth above, the CO shall ask for such details in an oral interview. Thereafter, the CO will prepare a written summary of the oral interview, and the Complainant will be asked to verify the accuracy of the reported charge by signing the document.

Upon receiving a formal complaint, the CO will consider whether any action should be taken in the investigatory phase to protect the Complainant from further discrimination or retaliation, including, but not limited to, a change of work assignment or schedule for the Complainant and/or the person who allegedly engaged in the misconduct. In making such a determination, the CO should consult the

Complainant to assess his/her agreement to the proposed action. If the Complainant is unwilling to consent to the proposed change, the CO may still take whatever actions s/he deem appropriate in consultation with the Superintendent.

Within two (2) business days of receiving the complaint, the CO or designee will initiate a formal investigation to determine whether the Complainant has been subjected to unlawful discrimination/retaliation.

Simultaneously, the CO will inform the individual alleged to have engaged in the discriminatory or retaliatory conduct (hereinafter referred to as the "Respondent"), that a complaint has been received. The Respondent will be informed about the nature of the allegations and provided with a copy of any relevant policies and/or administrative guidelines, including Policy 3122 - Non- Discrimination. The Respondent must also be informed of the opportunity to submit a written response to the complaint within five (5) business days.

Although certain cases may require additional time, the CO or a designee will attempt to complete an investigation into the allegations of discrimination/retaliation within fifteen (15) business days of receiving the formal complaint. The investigation will include:

- A. interviews with the Complainant;
- B. interviews with the Respondent;
- C. interviews with any other witnesses who may reasonably be expected to have any information relevant to the allegations;
- D. consideration of any documentation or other information presented by the Complainant, Respondent, or any other witness that is reasonably believed to be relevant to the allegations.

At the conclusion of the investigation, the CO or the designee shall prepare and deliver a written report to the Superintendent that summarizes the evidence gathered during the investigation and provide recommendations based on the evidence and the definition of unlawful discrimination/retaliation as provided in Board policy and State and Federal law as to whether the Complainant has been subjected to unlawful discrimination/retaliation. The CO's recommendations must be based upon the totality of the circumstances. In determining if discrimination or retaliation occurred, a preponderance of evidence standard will be used. The CO may consult with the Board's legal counsel, with permission of the Superintendent, before finalizing the report to the Superintendent.

Absent extenuating circumstances, within five (5) business days of receiving the report of the CO or the designee, the Superintendent must either issue a final decision regarding whether the charges have been substantiated or request further investigation. A copy of the Superintendent's final decision will be delivered to both the Complainant and the Respondent.

If the Superintendent requests additional investigation, the Superintendent must specify the additional information that is to be gathered, and such additional investigation must be completed within five (5) business days. At the conclusion of the additional investigation, the Superintendent must issue a final written decision as described above.

If the Superintendent determines the Complainant was subjected to unlawful discrimination/retaliation, s/he must identify what corrective action will be taken to stop, remedy, and prevent the recurrence of the

discrimination/retaliation. The corrective action should be reasonable, timely, age-appropriate and effective, and tailored to the specific situation.

The decision of the Superintendent shall be final.

The Board reserves the right to investigate and resolve a complaint or report of unlawful discrimination/retaliation regardless of whether the employee alleging the misconduct pursues the complaint. The Board also reserves the right to have the formal complaint investigation conducted by an external person in accordance with this policy or in such other manner as deemed appropriate by the Board or its designee.

The right of a person to a prompt and equitable resolution of the complaint shall not be impaired by the person's pursuit of other remedies such as the filing of a complaint with the Office for Civil Rights or the filing of a court case. Use of this internal complaint procedure is not a prerequisite to the pursuit of other remedies.

Privacy/Confidentiality

The School District will employ all reasonable efforts to protect the rights of the Complainant, the Respondent(s), and the witnesses as much as possible, consistent with the Board's legal obligations to investigate, to take appropriate action, and to conform with any discovery or disclosure obligations. All records generated under the terms of this policy shall be maintained as confidential to the extent permitted by law. Confidentiality, however, cannot be guaranteed. All Complainants proceeding through the formal investigation process will be advised that their identities may be disclosed to the Respondent(s).

During the course of a formal investigation, the CO or designee will instruct each person who is interviewed about the importance of maintaining confidentiality. Any individual who is interviewed as part of an investigation is expected not to disclose to third parties any information that s/he learns and/or provides during the course of the investigation.

Sanctions and Monitoring

The Board shall vigorously enforce its prohibitions against unlawful discrimination by taking appropriate action reasonably calculated to stop and prevent further misconduct. While observing the principles of due process, a violation of this policy may result in disciplinary action up to and including the discharge of an employee. All disciplinary action will be taken in accordance with applicable State law and the terms of the relevant collective bargaining agreement(s). When imposing discipline, the Superintendent shall consider the totality of the circumstances involved in the matter. In those cases where unlawful discrimination/retaliation is not substantiated, the Board may consider whether the alleged conduct nevertheless warrants discipline in accordance with other Board policies, consistent with the terms of the relevant collective bargaining agreement(s).

Where the Board becomes aware that a prior remedial action has been taken against an employee, all subsequent sanctions imposed by the Board and/or Superintendent shall be reasonably calculated to end such conduct, prevent its recurrence, and remedy its effect.

Retaliation

Retaliation against a person who makes a report or files a complaint alleging unlawful discrimination/retaliation, or participates as a witness in an investigation is prohibited. Specifically, the Board will not retaliate against, coerce, intimidate, threaten or interfere with any individual because the person opposed any act or practice made unlawful by any Federal or State civil rights law, or because that individual made a charge, testified, assisted or participated in any manner in an investigation, proceeding, or hearing under those laws, or because that individual exercised, enjoyed, aided or encouraged any other person in the exercise or enjoyment of any right granted or protected by those laws.

Education and Training

In support of this policy, the Board promotes preventative educational measures to create greater awareness of unlawful discriminatory practices. The Superintendent or designee shall provide appropriate information to all members of the School District community related to the implementation of this policy and shall provide training for District students and staff where appropriate. All training, as well as all information provided regarding the Board's policy and discrimination in general, will be age and content appropriate.

Retention of Investigatory Records and Materials

All individuals charged with conducting investigations under this policy shall retain all documents, electronically stored information ("ESI"), and electronic media (as defined in Policy 8315) created and/or received as part of an investigation, which may include but not be limited to:

- A. all written reports/allegations/complaints/grievances/statements/responses pertaining to an alleged violation of this policy;
- B. any narratives that memorialize oral reports/allegations/ complaints/grievances/statements/responses pertaining to an alleged violation of this policy;
- C. any documentation that memorializes the actions taken by District personnel related to the investigation and/or the District's response to the alleged violation of this policy;
- D. written witness statements;
- E. narratives, notes from, or audio, video, or digital recordings of witness interviews/statements;
- F. e-mails, texts, or social media posts that directly relate to or constitute evidence pertaining to an alleged violation of this policy (i.e., not after-the-fact commentary about or media coverage of the incident);
- G. notes or summaries prepared contemporaneously by the investigator in whatever form made (e.g., handwritten, keyed into a computer or tablet, etc.), but not including transitory notes whose content is otherwise memorialized in other documents;
- H. written disciplinary sanctions issued to students or employees and other documentation that memorializes oral disciplinary sanctions issued to students or employees for violations of this policy;
- I. dated written determinations/reports (including summaries of relevant exculpatory and inculpatory evidence) and other documentation that memorializes oral notifications to the parties concerning the outcome of the investigation, including any consequences imposed as a result of a violation of this policy;
- J. documentation of any interim measures offered and/or provided to complainants and/or the alleged perpetrators, including no-contact orders issued to both parties, the dates the no-contact orders were issued, and the dates the parties acknowledged receipt of the no-contact orders;
- K. documentation of all actions taken, both individual and systemic, to stop the discrimination or harassment, prevent its recurrence, eliminate any hostile environment, and remedy its discriminatory effects;
- L. copies of the Board policy and/or procedures/guidelines used by the District to conduct the investigation, and any documents used by the District at the time of the alleged violation to communicate the Board's expectations to students and staff with respect to the subject of this policy (e.g., Student and/or Employee Handbooks or Codes of Conduct);
- M. copies of any documentation that memorializes any formal or informal resolutions to the alleged discrimination or harassment;
- N. documentation of any training provided to District personnel related to this policy, including but not limited to, notification of the prohibitions and expectations of staff set forth in this policy and the role and responsibility of all District personnel involved in enforcing this policy, including their duty to report alleged violations of this policy and/or conducting an investigation of an alleged violation of this policy.

The documents, ESI, and electronic media (as defined in Policy 8315) retained may include public records and records exempt from disclosure under Federal (e.g., FERPA, ADA) and/or State law (e.g., R.C. 3319.321) – e.g., student records and confidential medical records.

The documents, ESI, and electronic media (as defined in Policy 8315) created or received as part of an investigation shall be retained in accordance with Policy 8310, Policy 8315, Policy 8320, and Policy 8330 for not less than three (3) years, but longer if required by the District's records retention schedule.

Revised 10/19/17

Revised 11/15/18

T.C. 3/8/21

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Legal

M.C.L. 37.2101 et seq., 37.1101 et seq.

Fourteenth Amendment, U.S. Constitution

20 U.S.C. Section 1681, Title IX of Education Amendment Act

20 U.S.C. Section 1701 et seq., Equal Educational Opportunities Act of 1974

20 U.S.C. Section 7905, Boy Scouts of America Equal Access Act

42 U.S.C. 6101 et seq., Age Discrimination Act of 1975

42 U.S.C. 12101 et seq., The Americans with Disabilities Act of 1990, as amended

34 C.F.R. Part 110 (7/27/93)

42 U.S.C. 2000ff et seq., The Genetic Information Nondiscrimination Act

42 U.S.C. 2000e et seq., Civil Rights Act of 1964

29 U.S.C. 701 et seq., Rehabilitation Act of 1973 as amended

29 C.F.R. Part 1635

AFFIDAVIT OF BIDDER - NON-COLLUSION

**Lansing School District
AFFIDAVIT OF BIDDER
SWORN STATEMENT
“Non-Collusion”**

DATE: _____

The Bidder, by its officers and agents or representatives, present at the time of filing this bid, being duly sworn, on their oaths, say that neither they nor any of them, have in any way, directly or indirectly, entered into any arrangement or agreement with any other Bidder, whereby such affiant or affiants or either of them has paid or is to pay to such other Bidder any sum of money, or has given, or is to give, to such other Bidder anything of value whatever, or such affiant or affiants or either of them has not, directly or indirectly, entered into any arrangement or agreement with any other Bidder or Bidders, which tends to or does lessen or destroy free competition in the letting of the Contract sought for by the attached bids; that no inducement of any form or character other than that which appears upon the face of the bid, will be suggested, offered, paid or delivered to any person whomsoever to influence the acceptance of the said bid or awarding of the Contract, nor has this Bidder any agreement or understanding of any kind whatsoever, with any person whomsoever to pay, deliver to, or share with any other person in any way or manner, any of the proceeds of the Contract sought by this bid.

IN TESTIMONY WHEREOF, the Bidder (an authorized individual) has agrees to the above:

(Company Name)

By: _____
(Authorized Signer)

Print or type Name and Title of Signer

Address: _____

Notary Public: _____

Subscribed and sworn to before me on this _____ day of _____, 2016

County of: _____ My Commission expires: _____

Telephone number: _____

IRAN ECONOMIC SANCTIONS ACT CERTIFICATE

In accordance with the Iran Economic Sanctions Act, Michigan 2012 PA 517, effective April 1, 2013, (MCL 129.311, *et seq.*), (the "Act"), the undersigned certifies in support of its bid or proposal that it is not an Iran linked business as such is defined in the Act.

Contractor: _____

By: _____

Dated: _____

Name: _____

Title: _____

Act No. 517
Public Acts of 2012
Approved by the Governor
December 28, 2012
Filed with the Secretary of State
December 28, 2012
EFFECTIVE DATE: April 1, 2013

**STATE OF MICHIGAN
96TH LEGISLATURE
REGULAR SESSION OF 2012**

Introduced by Senators Kahn, Marleau, Brandenburg, Anderson, Green and Booher

ENROLLED SENATE BILL No. 1024

AN ACT to prohibit persons who have certain economic relationships with Iran from submitting bids on requests for proposals with this state, political subdivisions of this state, and other public entities; to require bidders for certain public contracts to submit certification of eligibility with the bid; to require reports; and to provide for sanctions for false certification.

The People of the State of Michigan enact:

Sec. 1. This act shall be known and may be cited as the "Iran economic sanctions act".

Sec. 2. As used in this act:

- (a) "Energy sector of Iran" means activities to develop petroleum or natural gas resources or nuclear power in Iran.
- (b) "Investment" means 1 or more of the following:
 - (i) A commitment or contribution of funds or property.
 - (ii) A loan or other extension of credit.
 - (iii) The entry into or renewal of a contract for goods or services.
- (c) "Investment activity" means 1 or more of the following:
 - (i) A person who has an investment of \$20,000,000.00 or more in the energy sector of Iran.
 - (ii) A financial institution that extends \$20,000,000.00 or more in credit to another person, for 45 days or more, if that person will use the credit for investment in the energy sector of Iran.
- (d) "Iran" means any agency or instrumentality of Iran.
- (e) "Iran linked business" means either of the following:
 - (i) A person engaging in investment activities in the energy sector of Iran, including a person that provides oil or liquefied natural gas tankers or products used to construct or maintain pipelines used to transport oil or liquefied natural gas for the energy sector of Iran.
 - (ii) A financial institution that extends credit to another person, if that person will use the credit to engage in investment activities in the energy sector of Iran.
- (f) "Person" means any of the following:
 - (i) An individual, corporation, company, limited liability company, business association, partnership, society, trust, or any other nongovernmental entity, organization, or group.
 - (ii) Any governmental entity or instrumentality of a government, including a multilateral development institution, as defined in section 1701(c)(3) of the international financial institutional act, 22 USC 262r(c)(3).

(iii) Any successor, subunit, parent company, or subsidiary of, or company under common ownership or control with, any entity described in subparagraph (i) or (ii).

(g) "Public entity" means this state or an agency or authority of this state, school district, community college district, intermediate school district, city, village, township, county, public authority, or public airport authority.

Sec. 3. (1) Beginning April 1, 2013, an Iran linked business is not eligible to submit a bid on a request for proposal with a public entity.

(2) Beginning April 1, 2013, a public entity shall require a person that submits a bid on a request for proposal with the public entity to certify that it is not an Iran linked business.

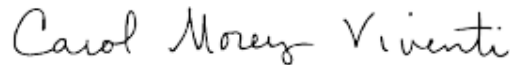
Sec. 4. If a public entity determines, using credible information available to the public, that a person has submitted a false certification under section 3(2), the public entity shall provide the person with written notice of its determination and of the intent not to enter into or renew a contract with the person. The notice shall include information on how to contest the determination and specify that the person may become eligible for a future contract with the public entity if the person ceases the activities that cause it to be an Iran linked business. The person shall have 90 days following receipt of the notice to respond in writing and to demonstrate that the determination of false certification was made in error. If a person does not make that demonstration within 90 days after receipt of the notice, the public entity may terminate any existing contract and shall report the name of the person to the attorney general together with information supporting the determination.

Sec. 5. The attorney general may bring a civil action against any person reported under section 4. If a civil action results in a finding that the person submitted a false certification, the person is responsible for a civil penalty of not more than \$250,000.00 or 2 times the amount of the contract or proposed contract for which the false certification was made, whichever is greater, the cost of the public entity's investigation, and reasonable attorney fees, in addition to the fine. A person who submitted a false certification shall be ineligible to bid on a request for proposal for 3 years from the date the public entity determines that the person has submitted the false certification.

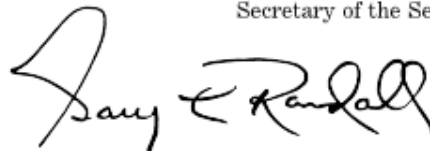
Sec. 6. The provisions of this act are effective only if Iran is a state sponsor of terror as defined under section 2 of the divestment from terror act, 2008 PA 234, MCL 129.292.

Enacting section 1. This act takes effect April 1, 2013.

This act is ordered to take immediate effect.



Secretary of the Senate



Clerk of the House of Representatives

LEGAL STATUS OF BIDDER

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS.

The Vendor and/or Bidder certifies to the best of its knowledge and belief that it and its principals: Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency; Have not within a three-year period preceding this agreement been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property; Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offences enumerated above in this certification; and Have not within a three-year period preceding this agreement had one or more public transactions (Federal, State, or local) terminated for cause or default; is not now or has been, within a three-year period preceding this date, been listed on the Excluded Parties List System website (EPLS).

Vendor/contractor will notify the Lansing School District Purchasing Office immediately upon becoming suspended or debarred if there is any current or ongoing contract or agreement in place between the district and the vendor/contractor.

Firm Name: _____
Address: _____
Phone & E-mail: _____

Name, title and signature of individual duly authorized to execute contracts:

The Owner, Principal, or Corporate Office of the responding firm is also attesting that all the information provided within this response is true.

Name: _____
Title: _____
Signature: _____

A Corporation organized and existing under the laws of the State of _____

General Conditions and Instructions to Bidders

1. Proposals shall be submitted on forms furnished by the owner. The proposal shall be in accordance with the specifications listed, which are available at the Lansing School District Purchasing Office.

Any variance from the specifications shall be fully explained in writing by the bidder and all prices quoted shall be on a unit price basis.

2. **MAILING OF PROPOSALS:**

Proposals shall be mailed in an opaque, sealed envelope and shall be clearly marked describing the project upon which the bid is made.

3. No oral, telegraphic facsimile, or electronic mail proposals or modifications will be considered.

- 4 **WITHDRAWAL OF BIDS:**

Any bidder may withdraw their bid at any time prior to the scheduled time of opening the bids upon the presentation of proper identification. After the opening of the bids, no proposal shall be withdrawn for a period of ninety (90) days.

5. **PROPOSAL FORMS AND SIGNATURES:**

Proposals shall be made on the proper forms provided by the owner. All spaces shall be properly filled in with ink or typewriter. The signatures shall be in longhand in ink by an authorized representative.

6. **BRANDS:**

The naming of a manufacturer, brand or model number shall not be considered as excluding other brands or models. Specifically, similar products with comparable construction, material and workmanship shall be considered as equal. However, the Board of Education of the Lansing School District shall evaluate the merits of all bids submitted and reserves the right to accept or reject any or all bids.

It is the intent of the attached specifications to define the minimum quality of equipment acceptable. The product lines of nationally recognized manufacturers who regularly advertise, promote and distribute catalog products to the school market are required.

7. **SAMPLES:**

Samples shall be submitted upon request at the expense of each bidder. These samples will be retained as control items until the completion of the delivery and installation.

8. **AGENDA:**

Any modifications of contract documents will be issued in the form of an addendum.

All addenda issued during the bidding time shall become part of the specifications. A copy of the addendum shall be sent to all bidders. No verbal statements by the owner shall be considered as authoritative. No request for explanations can be processed within four (4) days immediately prior to the bid opening date.

9. **VARIATIONS FROM MATERIALS SPECIFIED:**

All variations from the specified material or equipment shall be fully explained and included with the bid. Manufacturer numbers shall be used in all cases.

10. **ROYALTIES AND PATENTS:**

The contract shall pay for all royalties and patents, and shall defend all suits for claims or infringements on patent rights and save the owner harmless from loss on account thereof.

11. **CLEAN-UP:**

The contractor shall at all times, keep the premises free from accumulations of waste materials or same caused by the work; and upon completing the work, shall remove all work related rubbish from and about the building and shall leave the work broom clean, or it equivalent. In the case of dispute, the owner may remove the rubbish and charge the cost to the contractor, as the owner shall determine.

12. **FEDERAL, STATE AND MUNICIPAL TAXES:**

Each proposal submitted shall include, and the contractor shall pay, all taxes which are levied by the Federal, State and Municipal Governments, on labor, and for materials entering into the work. The owner reserves the right to require evidence of payment of such taxes prior to final payment. The school district is exempt from Federal Excise Tax.

General Conditions and Instructions to Bidders

13. QUALIFICATIONS OF BIDDERS:

The owner may request any or all bidders to submit any of the following information before the award of the contracts.

- A. A bidder's performance record
- B. The address and description of bidder's equipment, plant or permanent place of business.
- C. An itemized list of the bidder's equipment, plant and personnel.
- D. A bidder's financial statement.
- E. A description of any project which the bidder has completed.
- F. Such additional information as will satisfy the owner that the bidder is adequately prepared to fulfill the contract.
- G. Description of work which will be done simultaneously with the owner's project.

14. NOTICE OF AWARD:

The contracts shall be deemed as having been awarded when the formal notice of acceptance of their proposal has been duly served upon the intended awardees (normally by purchase order) by some officer or agent of the owner duly authorized to give such notice.

15. GUARANTEE:

Each contract shall furnish the owner a written guarantee running for one (1) year, or longer as required herein, after the final payment covering all work in the contract. Any defects in workmanship or materials for which a claim is submitted within this period shall be corrected.

16. DOCUMENTS:

The Proposals submitted shall be based upon the specifications contained herein.

17. RIGHTS OF ACCEPTANCE OR REJECTION:

The Board of Education of the Lansing School District reserves the right to reject any or all bids in whole or in part and to accept the bid or portion of bid that, in their opinion, best serves the interest of the School District.

18. Contractors and subcontractors are required not to be discriminated against any employee or applicant for employment, to be employed in the performance of this contract, with respect to hire, tenure, terms, conditions or privileges of employment because of race, color, religion, national origin, or ancestry or also because of age or sex, except based on a bonafide occupational qualification. Breach of this covenant of purchasing agreement as provided in the Michigan Fair Employment Practices Act and may be processed there under. See Policy 6320.

policy

**BOARD OF EDUCATION
LANSING SCHOOL DISTRICT**

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PURCHASING

Procurement of all supplies, materials, equipment, and services paid for from District funds shall be made in accordance with all applicable Federal and State statutes, Board policies, and administrative procedures. Standards of conduct covering conflicts of interest and governing the actions of its employees engaged in the selection, award, and administration of contracts are established in Policy 1130, Policy 3110, and Policy 4110 – Conflict of Interest.

All procurement transactions shall be conducted in a manner that encourages full and open competition and in accordance with good administrative practice and sound business judgement.

Each year the State of Michigan informs the School of the legal amount for purchases which require a formal bidding process of a single item.

It is the policy of the Board that the Superintendent adhere to the following:

- A. Seek informal price quotations on purchases in excess of \$3,000.
- B. When the purchase of, and contract for, single items of supplies, materials, or equipment is less than the amount allowed by State statute, but exceeds \$10,000 the Superintendent shall whenever possible, require three (3) competitive price quotations.

Purchases in a single transaction that are in excess of the dollar amount permitted by State statute shall require competitive bids and, whenever possible, have at least three (3) such bids for substantiation of purchase and shall require approval of the Board prior to purchase.

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Competitive Bids

Competitive bids are not required for items purchased through the cooperative bulk purchasing program operated by the Michigan Department of Management and Budget pursuant to M.C.L. 18.1263.

Competitive bids are not required for food purchases, unless food purchased in a single transaction costs \$100,000 or more.

When food purchased in a single transaction exceeds \$100,000, the Superintendent shall, whenever possible, require three (3) competitive price quotations.

Bids shall be sealed and shall be opened by the Director of Purchasing in the presence of at least one (1) witness. All orders or contracts should be awarded to the lowest responsible bidder; however, consideration can be given to:

- A. the quality of the item(s) to be supplied;
- B. its conformity with specifications;
- C. suitability to the requirements of the school;
- D. delivery terms;
- E. past performance of vendor.

In addition to the factors above, the Board may consider and provide a preference to bidders

- A. which use a Michigan-based business as the primary contractor.
- B. which use one (1) or more Michigan-based business as subcontractors.

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For purposes of this preference a Michigan-based business means a business that would qualify for a Michigan preference for procurement contracts under M.C.L. 18.1268, which requires that the businesses certify that since inception or during the last twelve (12) months it has done one of the following:

- A. have filed a Michigan business tax return showing an allocation of income tax base to Michigan
- B. have filed a Michigan income tax return showing income generated in or attributed to Michigan
- C. withheld Michigan income tax from compensation paid to the bidder's owners and remitted the tax to the Michigan Department of Treasury

This preference shall not apply to any procurement or project using Federal funds, nor shall it be used if it would violate any Federal law or requirements.

The Board reserves the right to reject any and all bids.

Contracts may be awarded by the Superintendent without Board approval for any single item or group of identical items costing less than the dollar amount permitted by State Statute. All other contracts require Board approval prior to purchase.

Bid Protest

A bidder who wishes to file a bid protest must file such notice and follow procedures prescribed by the Request For Proposals (RFP) or the individual bid specifications package, for resolution. Bid protests must be filed in writing with the Office of the Superintendent within seventy-two (72) hours of the opening of the bids in protest.

Within five (5) days of receipt of a protest, the Superintendent shall review the protest as submitted and render a decision regarding the merits of the protest and any impact on the acceptance and rejection of bids submitted. Notice of the filing of a bid protest shall be communicated to the Board and shall be so noted in any subsequent recommendation for the acceptance of bids and awarding of contracts.

Failure to file a notice of intent to protest, or failure to file a formal written protest within the time prescribed, shall constitute a waiver of proceedings.

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General Provisions

The Superintendent is authorized to purchase all items within budget allocations.

The Board should be advised, for prior approval, of all purchases of equipment, materials, and services when the purchase

- A. was not contemplated during the budgeting process.
- B. exceeds the previously Board approved amount by ten percent (10%).

The Superintendent is authorized to make emergency purchases, without prior approval, of those goods and/or services needed to keep the school in operation. Such purchases shall be brought to the Board's attention at the next regular meeting.

In order to promote efficiency and economy in the operation of the school, the Board requires that the Superintendent periodically estimate requirements for standard items or classes of items and make quantity purchases on a bid basis to procure the lowest cost consistent with good quality.

Whenever storage facilities or other conditions make it impractical to receive total delivery at any one time, the total quantity to be shipped but with staggered delivery dates, shall be made a part of the bid specifications.

Before placing a purchase order, the Superintendent shall check as to whether the proposed purchase is subject to bid, whether sufficient funds exist in the budget, and whether the material might be available elsewhere in the school. All purchase orders shall be numbered consecutively.

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The Superintendent shall determine the amount of purchase which shall be allowed without a properly signed purchase order. Employees may be held personally responsible for anything purchased without a properly signed purchase order or authorization.

The Board may acquire office equipment as defined in law by lease, by installment payments, by entering into lease-purchase agreements, or by lease with an option to purchase, provided the contract sets forth the terms of such a purchase.

Procurement – Federal Grants

The Superintendent shall maintain a procurement and contract administration system in accordance with the USDOE requirements (34 CFR 80.36) for the administration and management of Federal grants and federally-funded programs. The District shall maintain a compliance system that requires contractors to perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders. Except as otherwise noted, procurement transactions shall conform to the provisions of this policy and administrative guidelines (AG 6320).

M.C.L. 380.1267, 380.1274 et seq.

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policy

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NEW SCHOOL CONSTRUCTION, RENOVATION

Before beginning construction of a new school building, or an addition, repair or renovation of an existing school building, except emergency repairs, the Board of Education, shall obtain competitive bids on all the material and labor required for the complete construction of a proposed new building or addition to or repair or renovation of an existing school building which exceeds the State statutory limit.

This policy does not apply to buildings, renovations, or repairs costing less than the statutory limit or to repair work normally performed by District employees.

The Board shall advertise for the bids required under subsection:

- A. By placing an advertisement for bids at least once in a newspaper of general circulation in the area where the building or addition is to be constructed or where the repair or renovation of an existing building is to take place and by posting an advertisement for bids for at least two (2) weeks on the Department of Management and Budget website on a page on the website maintained for this purpose or on a website maintained by a school organization and designated by the Department of Management and Budget for this purpose.
- B. By submitting the request for bids for placement on the Michigan Department of Management and Budget's website for school organizations, including a link to the District's website.
- C. The advertisement for bids shall do all of the following:
 1. specify the date and time by which all bids must be received by the Board at a designated location;
 2. state that the Board will not consider or accept a bid received after the date and time specified for bid submission;
 3. identify the time, date, and place of a public meeting at which the Board or its designee will open and read aloud each bid received by the Board by the date and time specified in advertisement;

policy

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4. state that the bid shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any member of the Board or the Superintendent of the District. A Board shall not accept a bid that does not include this sworn and notarized disclosure statement.
- D. The Board shall require each bidder for a contract under this policy, to file with the Board security in an amount not less than 1/20 of the amount of the bid conditioned to secure the District from loss or damage by reason of the withdrawal of the bid or by the failure of the bidder to enter a contract for performance, if the bid is accepted by the Board.
- E. The Board shall not open, consider, or accept a bid that the Board receives after the date and time specified for bid submission in the advertisement for bids as described in subsection C of this policy.
- F. At a public meeting identified in the advertisement for bids described in subsection C of this policy, the Board or its designee shall open and read aloud each bid that the Board received at or before the time and date for bid submission specified in the advertisement for bids. The Board may reject any or all bids, and if all bids are rejected, shall readvertise in the manner required by this policy.

The Board may consider and provide a preference to bidders:

1. which use a Michigan-based business as the primary contractor.
2. which use one (1) or more Michigan-based business(es) as subcontractors.

policy

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For purposes of this preference a Michigan-based business means a business that would qualify for a Michigan preference for procurement contracts under M.C.L. 18.1268, which requires that the businesses certify that since inception or during the last twelve (12) months it has done one of the following:

1. have filed a Michigan business tax return showing an allocation of income tax base to Michigan
2. have filed a Michigan income tax return showing income generated in or attributed to Michigan
3. withheld Michigan income tax from compensation paid to the bidder's owners and remitted the tax to the Michigan Department of Treasury

This preference shall not apply to any procurement or project using Federal funds, nor shall it be used if it would violate any Federal law or requirements.

- G. The competitive bid threshold amount specified in this policy (\$20,959 for 2009) is adjusted each year by multiplying the amount for the immediately preceding year by the percentage by which the average consumer price index for all items for the twelve (12) months ending August 31st of the year in which the adjustment is made differs from that index's average for the twelve (12) months ending on August 31st of the immediately preceding year and adding that product to the maximum amount that applied in the immediately preceding year, rounding to the nearest whole dollar. The current exempt amount must be confirmed with the Michigan Department of Education prior to issuing contracts for construction, renovation, or repair which exceed the amount listed in this policy.

M.C.L. 380.1267

NEW POLICY - VOL. 30, NO. 2

PROCUREMENT – FEDERAL GRANTS/FUNDS

Procurement of all supplies, materials, equipment, and services paid for from Federal funds or District matching funds shall be made in accordance with all applicable Federal, State, and local statutes and/or regulations, the terms and conditions of the Federal grant, Board of Education policies, and administrative procedures.

The Superintendent shall maintain a procurement and contract administration system in accordance with the USDOE requirements (2 CFR 200.317-.326) for the administration and management of Federal grants and Federally-funded programs. The District shall maintain a contract administration system that requires contractors to perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders. Except as otherwise noted, procurement transactions shall conform to the provisions of the District's documented general purchasing Policy 6320 and AG 6320.

All District employees, officers, and agents who have purchasing authority shall abide by the standards of conduct covering conflicts of interest and governing the actions of its employees, officers, and agents engaged in the selection, award, and administration of contracts as established in Policy 1130, Policy 3110 and Policy 4110 – Conflict of Interest.

The District will avoid acquisition of unnecessary or duplicative items. Additionally, consideration shall be given to consolidating or breaking out procurements to obtain a more economical purchase. And, where appropriate, an analysis shall be made of lease versus purchase alternatives, and any other appropriate analysis to determine the most economical approach. These considerations are given as part of the process to determine the allowability of each purchase made with Federal funds.

To foster greater economy and efficiency, the District may enter into State and local intergovernmental agreements where appropriate for procurement or use of common or shared goods and services.

Competition

All procurement transactions shall be conducted in a manner that encourages full and open competition and that is in accordance with good administrative practice and sound business judgement. In order to promote objective contractor

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performance and eliminate unfair competitive advantage, the District shall exclude any contractor that has developed or drafted specifications, requirements, statements of work, or invitations for bids or requests for proposals from competition for such procurements.

Some of the situations considered to be restrictive of competition include, but are not limited to, the following:

- A. unreasonable requirements on firms in order for them to qualify to do business;
- B. unnecessary experience and excessive bonding requirements;
- C. noncompetitive contracts to consultants that are on retainer contracts;
- D. organizational conflicts of interest;
- E. specification of only a “brand name” product instead of allowing for an “*or equal*” product to be offered and describing the performance or other relevant requirements of the procurement; and
- F. any arbitrary action in the procurement process.

Further, the District does not use statutorily or administratively imposed State, local, or tribal geographical preferences in the evaluation of bids or proposals, unless (1) an applicable Federal statute expressly mandates or encourages a geographic preference; or (2) the District is contracting for architectural and engineering services, in which case geographic location may be a selection criterion provided its application leaves an appropriate number of qualified firms, given the nature and size of the project, to compete for the contract.

To the extent that the District uses a pre-qualified list of persons, firms or products to acquire goods and services, the pre-qualified list includes enough qualified sources as to ensure maximum open and free competition. The District allows vendors to apply for consideration to be placed on the list annually.

Solicitation Language

The District shall require that all solicitations incorporate a clear and accurate description of the technical requirements for the material, product, or service to be procured. Such description shall not, in competitive procurements, contain features which unduly restrict competition. The description may include a statement of the qualitative nature of the material, product or service to be procured and, when necessary, shall set forth those minimum essential characteristics and standards to which it shall conform if it is to satisfy its intended use. Detailed product specifications should be avoided if at all possible.

When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a “brand name or equivalent” description may be used as a means to define the performance or other salient requirements of procurement. The specific features of the named brand which shall be met by offers shall be clearly stated; and identify all requirements which the offerors shall fulfill and all other factors to be used in evaluating bids or proposals.

The Board will not approve any expenditure for an unauthorized purchase or contract.

Procurement Methods

The District shall utilize the following methods of procurement:

Micro-purchases

Procurement by micropurchase is the acquisition of supplies or services, the aggregate dollar amount of which does not exceed \$3000. To the extent practicable, the District shall distribute micro-purchases equitably among qualified suppliers. Micro-purchases may be made without soliciting competitive quotations if Superintendent considers the price to be reasonable. The District maintains evidence of this reasonableness in the records of all purchases made by this method.

Small Purchases

Small purchase procedures provide for relatively simple and informal procurement methods for securing services, supplies, and other property that does not exceed the competitive bid threshold established annually by the State. Small purchase procedures require that price or rate quotations shall be obtained from an adequate number of qualified sources.

Sealed Bids

Sealed, competitive bids shall be obtained when the purchase of, and contract for, single items of supplies, materials, or equipment which amounts to the amount allowed by Michigan statute and when the Board determines to build, repair, enlarge, improve, or demolish a school building/facility the cost of which will exceed the amount allowed by Michigan statute.

In order for sealed bidding to be feasible, the following conditions shall be present:

1. a complete, adequate, and realistic specification or purchase description is available;
2. two (2) or more responsible bidders are willing and able to compete effectively for the business; and
3. the procurement lends itself to a firm fixed price contract and the selection of the successful bidder can be made principally on the basis of price.

When sealed bids are used, the following requirements apply:

1. Bids shall be solicited in accordance with the provisions of State law and Policy 6320. Bids shall be solicited from an adequate number of qualified suppliers, providing sufficient response time prior to the date set for the opening of bids. The invitation to bid shall be publicly advertised.
2. The invitation for bids will include product/contract specifications and pertinent attachments and shall define the items and/or services required in order for the bidder to properly respond.
3. All bids will be opened at the time and place prescribed in the invitation for bids; bids will be opened publicly.

4. A firm fixed price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life cycle costs shall be considered in determining which bid is lowest. Payment discounts may only be used to determine the low bid when prior experience indicates that such discounts are usually taken.
5. The Board reserves the right to reject any or all bids for sound documented reason.

Competitive Proposals

Procurement by competitive proposal, normally conducted with more than one source submitting an offer, is generally used when conditions are not appropriate for the use of sealed bids or in the case of a recognized exception to the sealed bid method.

If this method is used, the following requirements apply:

1. Requests for proposals shall be publicized and identify all evaluation factors and their relative importance. Any response to the publicized requests for proposals shall be considered to the maximum extent practical.
2. Proposals shall be solicited from an adequate number of sources.
3. The District shall use its written method for conducting technical evaluations of the proposals received and for selecting recipients.

4. Contracts shall be awarded to the responsible firm whose proposal is most advantageous to the program, with price and other factors considered.

The District may use competitive proposal procedures for qualifications-based procurement of architectural/engineering (A/E) professional services whereby competitors' qualifications are evaluated and the most qualified competitor is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in procurement of A/E professional services. It cannot be used to purchase other types of services though A/E that firms are a potential source to perform the proposed effort.

Noncompetitive Proposals

Procurement by noncompetitive proposals allows for solicitation of a proposal from only one source and may be used only when one or more of the following circumstances apply:

1. the item is available only from a single source
2. the public exigency or emergency for the requirement will not permit a delay resulting from competitive solicitation
3. the Federal awarding agency or pass-through entity expressly authorizes noncompetitive proposals in response to a written request from the District
4. after solicitation of a number of sources, competition is determined to be inadequate

Contract/Price Analysis

The District shall perform a cost or price analysis in connection with every procurement action in excess of \$150,000, including contract modifications. A cost analysis generally means evaluating the separate cost elements that make up the total price, while a price analysis means evaluating the total price, without looking at the individual cost elements.

The method and degree of analysis is dependent on the facts surrounding the particular procurement situation; however, the District shall come to an independent estimate prior to receiving bids or proposals.

When performing a cost analysis, the District shall negotiate profit as a separate element of the price. To establish a fair and reasonable profit, consideration is given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.

Time and Materials Contracts

The District uses a time and materials type contract only (1) after a determination that no other contract is suitable; and (2) if the contract includes a ceiling price that the contractor exceeds at its own risk. Time and materials type contract means a contract whose cost to the District is the sum of the actual costs of materials, and direct labor hours charged at fixed hourly rates that reflect wages, general and administrative expenses, and profit.

Since this formula generates an open-ended contract price, a time-and-materials contract provides no positive profit incentive to the contractor for cost control or labor efficiency. Therefore, the District sets a ceiling price for each contract that the contractor exceeds at its own risk. Further, the District shall assert a high degree of oversight in order to obtain reasonable assurance that the contractor is using efficient methods and effective cost controls.

Suspension and Debarment

The District will award contracts only to responsible contractors possessing the ability to perform successfully under the terms and conditions of the proposed procurement. All purchasing decisions shall be made in the best interests of the District and shall seek to obtain the maximum value for each dollar expended. When making a purchasing decision, the District shall consider such factors as (1) contractor integrity; (2) compliance with public policy; (3) record of past performance; and (4) financial and technical resources.

The Superintendent shall have the authority to suspend or debar a person/corporation, for cause, from consideration or award of further contracts. The District is subject to and shall abide by the nonprocurement debarment and suspension regulations implementing Executive Orders 12549 and 12689, 2 CFR Part 180.

Suspension is an action taken by the District that immediately prohibits a person from participating in covered transactions and transactions covered under the Federal Acquisition Regulation (48 CFR chapter 1) for a temporary period, pending completion of an agency investigation and any judicial or administrative proceedings that may ensue. A person so excluded is suspended. (2 CFR Part 180 Subpart G)

Debarment is an action taken by the Superintendent to exclude a person from participating in covered transactions and transactions covered under the Federal Acquisition Regulation (48 CFR chapter 1). A person so excluded is debarred. (2 CFR Part 180 Subpart H)

The District shall not subcontract with or award subgrants to any person or company who is debarred or suspended. For contracts over \$25,000, the District shall confirm that the vendor is not debarred or suspended by either checking the Federal government's System for Award Management, which maintains a list of such debarred or suspended vendors at www.sam.gov; collecting a certification from the vendor; or adding a clause or condition to the covered transaction with that vendor. (2 CFR Part 180 Subpart C)

Bid Protest

The District maintains the following protest procedures to handle and resolve disputes relating to procurements and, in all instances, discloses information regarding the protest to the awarding agency.

A bidder who wishes to file a bid protest shall file such notice and follow procedures prescribed by the Request For Proposals (RFPs) or the individual bid specifications package, for resolution. Bid protests shall be filed in writing with the Superintendent within seventy-two (72) hours of the opening of the bids in protest.

Within five (5) days of receipt of a protest, the Superintendent shall review the protest as submitted and render a decision regarding the merits of the protest and any impact on the acceptance and rejection of bids submitted. Notice of the filing of a bid protest shall be communicated to the Board and shall be so noted in any subsequent recommendation for the acceptance of bids and awarding of contracts.

Failure to file a notice of intent to protest, or failure to file a formal written protest within the time prescribed, shall constitute a waiver of proceedings.

Maintenance of Procurement Records

The District maintains records sufficient to detail the history of all procurements. These records will include, but are not necessarily limited to the following: rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price (including a cost or price analysis).

Applicable laws and regulations:
2 C.F.R. 200.317 - .326

policy

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PREVAILING WAGE COORDINATOR

It is the purpose of this policy to comply with State and Federal regulations concerning prevailing wage rate.

The Michigan Department of Consumer and Industry Services; Wage and Hour Division will determine the prevailing wage rate in the locality where the work is to be performed.

The Superintendent shall designate a Prevailing Wage Coordinator for this District.

The Prevailing Wage Coordinator will submit to the Superintendent, for Board of Education approval, procedures for monitoring compliance with prevailing wage laws. S/He will request the Michigan Department of Consumer and Industry Services; Wage and Hour Division to establish the prevailing wage rate in this District for school construction or renovation projects. A schedule of those wages must be attached to the specifications for the work, and printed on any bidding blanks. A copy of the bidding blank must be filed with the Michigan Department of Consumer and Industry Services; Wage and Hour Division prior to the award of any contract. Thereafter, any contract which is awarded must include a provision that each laborer, workman, or mechanic employed by the contractor will be paid at a rate not less than the prevailing wage rate. On the first pay date, the contractors and subcontractors must provide each employee with written notification of his/her job classification and the prevailing wage rate for his/her job classification, unless the employee is covered by a collective bargaining agreement.

M.C.L. 408.551 et seq.

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policy

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COOPERATIVE PURCHASING

The Board of Education recognizes the advantages of centralized purchasing in that volume buying tends to maximize value for each dollar spent. The Board, therefore, encourages the administration to seek advantages in savings that may accrue to this District through joint agreements for the purchase of supplies, equipment, or services with the governing body(ies) of other governmental units.

The Board authorizes the Business Manager to negotiate such joint purchase agreements for services, supplies, and equipment which may be determined to be required from time to time by the Board and which the Board may otherwise lawfully purchase for itself, with governmental contracting units as may be appropriate in accordance with State law, the policies of this Board, and the dictates of sound purchasing procedures.

Cooperative or joint purchases require an agreement approved by the Board and the participating contracting body(ies) which shall specify the categories of equipment and supplies to be purchased; the manner of advertising for bids and of awarding contracts; the method of payment by each participating party and such other matters as may be deemed necessary to carry out the purposes of the agreement. Such agreements are subject to all legal bidding requirements.

M.C.L. 124.1 et seq.

policy

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LOCAL PURCHASING

The Board of Education recognizes its position as a major purchaser in this community, and while it is the intention of the Board to purchase materials and supplies of quality at the lowest possible cost through widespread competition, if all other considerations are equal, the Board prefers to purchase within the District from established local merchants.

The Board authorizes the Superintendent to award purchases placed in accordance with law, this policy, and all policies of the Board otherwise applicable to local merchants when

- A. their quotation is competitive, within a percentage determined by the Board,
- B. freight charges are a factor,
- C. maintenance service may be required,
- D. promptness of delivery is a consideration,

provided that all statutes pertaining to public purchasing are duly observed.

policy

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VENDOR RELATIONS

The Board of Education shall not enter a contract knowingly with any supplier of goods or services to this District under which any Board member or officer, employee, or agent of this School District has any pecuniary or beneficial interest, direct or indirect, unless the person has not solicited the contract or participated in the negotiations leading up to the contract. This prohibition shall not prevent any person from receiving royalties upon the sale of any textbook of which s/he is the author and which has been properly approved for use in the schools of this District.

For the purpose of this policy "beneficial interest" shall be determined in accordance with M.C.L. 15.321 et seq.

Board members and school personnel shall not accept any gifts or favors from vendors which might, in any way, influence their recommendations on the eventual purchase of equipment, supplies, or services.

All sales persons, regardless of product, shall clear with the Superintendent's Office before contacting any teachers, students, or other personnel of the School District. Purchasing personnel shall not show any favoritism to any vendor. Each order shall be placed in accordance with policies of the Board on the basis of quality, price, and delivery with past service a factor if all other considerations are equal.

M.C.L. 15.321 et seq.



In order to maintain the public trust, your local school district Board of Education should consider and adopt a resolution containing at least some, if not all, of the factors listed below.

Each factor should be discussed thoroughly by school board members, the architects and construction managers involved in any school construction because of the potential impact they will have on a project.

Your construction manager and design professional will then include these factors in the construction bid documents so all bidders know that in addition to price these items will be considered when construction bids are reviewed.



EXPERIENCE. Institutional building projects are expected to last 50-75 years. Therefore school board members should review the past experience of all construction professionals to ensure that they have pertinent experience on similar institutional projects. In so doing, the board members can evaluate whether local contractors should be considered for the project and only if they have the required experience should they be considered.



REFERENCES. School board members should investigate the references of their construction professionals from past clients doing similar institutional work. Construction professionals must supply pertinent references from their past clients, including information regarding performance and jobsite cooperation.





FINANCIAL CONDITION. A good financial rating means stability on the job and all through the project. Construction professionals must show they are financially prepared to perform the work they are bidding on. School boards must obtain information concerning a bidder's financial capability, any outstanding claims against them and bank references. A poor financial condition can affect the quality of materials, equipment and workers used on the project. It also can result in substantial project delays and unsafe schools.



SAFETY & ACCIDENTS. Construction professionals with a good safety and EMR record will be more productive. An employer has an obligation according to the Michigan Occupational Safety and Health Act (MIOSHA) to provide a place of employment free from recognized hazards likely to cause death or serious physical harm. Every employee has the right to a safe and healthy workplace. An employer must provide training in the recognition and avoidance of hazards and specific training called for in the MIOSHA standards.



RESUME OF SUPERVISORY PERSONNEL. Beyond a construction professional's experience with similar institutional projects, it is important for board members to evaluate the resumes of the supervisory personnel of all construction professionals on their project. All supervisory personnel should have pertinent experience and adequate education and training to complete your project.



INSURANCE & SURETY BONDING. Construction professionals must show proof of adequate and relevant insurance coverage for a particular project and must prove their compliance with workers' compensation statutes. School boards must set minimum standards for insurance coverage. Construction professionals that cannot provide proper coverage may be unable to fulfill project obligations. A measure of a construction professional's stability is shown in the ability to secure the required bonding.



USE OF A TRAINED LOCAL WORKFORCE. Employing local construction professionals and skilled craft workers on a project can be an attractive goal for school boards. Local craft workers, their friends and family, in all probability use those schools. However, it is necessary to determine if the construction professional has ready access to a qualified, experienced workforce to build your project.



PREVAILING WAGE. Use of prevailing wage requirements ensures that school boards secure the best qualified construction professionals to perform work on their projects. Construction professionals should compete for projects on the basis of their management practices, not by paying sub-standard wages. Utilization of prevailing wage will allow the construction professional to pay locally determined wages and benefits to attract qualified skilled craft workers.



EMPLOYEE HEALTH INSURANCE & PENSION BENEFITS. School districts can maintain and promote their community's health care and craft employees by requiring the construction professional to use prevailing wage, which includes health insurance and pension benefits. Construction professionals who provide such benefits to their craft personnel demonstrate a commitment to developing a stable workforce, which is a key component to a quality project and to the health of the community.



WORKFORCE SOURCE & PROPER EMPLOYEE CLASSIFICATION. School boards can ensure that their project will be built by qualified construction professionals by ensuring contractor access to a skilled workforce. School districts should examine carefully the source of building trades craft employees. School districts should ask prospective construction professionals to identify the source of the workforce they intend to use on the project. Construction professionals who staff the project with personnel hired from help-wanted ads or employment agencies might not have sufficient competence and ability to complete a quality project on schedule.



REGISTERED UNITED STATES DEPARTMENT OF LABOR, BUREAU OF

APPRENTICESHIP & TRAINING PROGRAMS. School boards know the value of high quality training and education. Responsible contractors know that better training equals better buildings. Bureau of Apprenticeship and Training (BAT) approved training programs create more productive craft workers. A construction professional's ability to staff a school construction project with qualified trades' workers is the key to success. Contractors, who bid on school construction projects should maintain, participate in and contribute to bona fide apprentice training programs recognized by the U.S. D.O.L./B.A.T. Trained craft workers promote cost effectiveness, timeliness, safety and quality on school construction work. Companies who employ skilled and trained workers, educated in their trade, deliver exceptional work. Moreover, every registered U.S. D.O.L./B.A.T., program must meet twenty-two standards of apprenticeship regulated and audited by the U.S. D.O.L./B.A.T., as outlined in 29 CFR 29.5.



LICENSING. School boards get a better building when highly competent construction professionals and tradespersons build it to code. State law establishes licensing requirements for

electrical, mechanical, plumbing, boiler and elevator contractors, and electrical,

elevator and plumbing craft workers. Proper licensing and certification,

when applicable, show school boards that construction

professionals bidding the job have been tested and are

competent to perform the work. All responsible construction

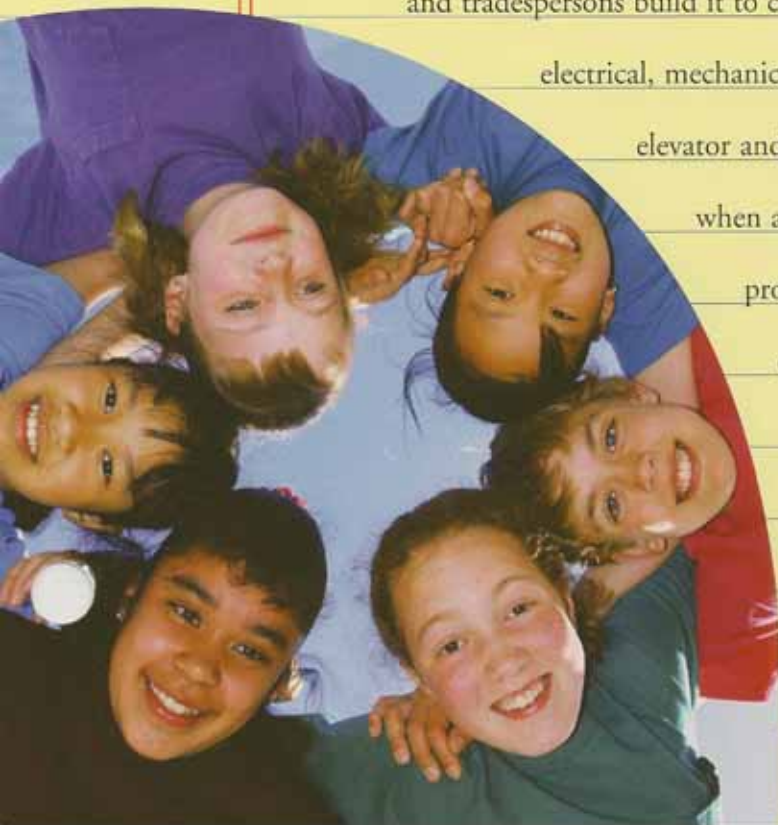
professionals must provide documented proof of licensing

and certification. This will allow school boards to contact

licensing and certification agencies to verify the bidder's

history and determine if any complaints or judgments

have been filed against them.





COMPLIANCE WITH REGULATORY AGENCIES. School boards get a higher quality building when local, state and federal regulations are followed. Compliance with the EPA, MIOSHA, OSHA and other agencies helps school boards evaluate the construction professional's willingness to follow rules. It also ensures that the bidding contractors are aware of the policies that affect them. Contractor adherence to wage and hour standards, record keeping guidelines, child labor regulations and other components of the Fair Labor Standards Act are good indicators of a stable workforce. Construction craft workers who are treated fairly and receive proper pay and benefits are more likely to produce high quality work which helps ensure a safe learning environment for Michigan children.



CIVIL SUITS/ARBITRATION/HISTORY. A school board will have their building projects completed without costly legal entanglements if they select a responsible contractor with a 'clean' legal history. School boards should contract with construction professionals that build according to contract – not in spite of the contract. School districts should carefully examine a contractor's litigation history and the final disposition of any arbitration claims brought against him/her. A contractor with an unusually high level of adverse claims might indicate that the school board should disqualify the contractor.



Michigan Association for Responsible Contracting

phone: 1-866-YES-MARC • fax: 517-372-0402 • www.miarc.org



SECTION 01 20 00.01 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 CASH ALLOWANCES

A. Cash Allowances: The following allowances are to be included in the base bid for the respective work categories listed below. Allowances will be only be utilized at the owner's discretion and written authorization.

- **Work Category 02A—Demolition**

Allowance #1: \$5,000 to be used at Owner's discretion.

- **Work Category 03A—Concrete/Sitework**

Allowance #1: \$10,000 for restoration and seeding due to damage to site during construction process.

- **Work Category 07A—Siding/Fascia/Soffit Repair/Gutter & Down Spout**

Allowance #1: \$25,000 to be used at Owner's discretion

- **Work Category 09A—Carpentry and Interiors**

Allowance #1: \$10,000 to be used at Owner's discretion.

- **Work Category 09B—Floor Coverings**

Allowance #1: \$3,500 for floor leveling exceeding manufacturer's minimum recommendations

- **Work Category 22A—Plumbing**

Allowance #1: \$2,500 for firestopping of existing plumbing piping through rated walls in work areas.

- **Work Category 23A—Mechanical**

Allowance #1: \$2,500 for firestopping of existing HVAC piping through rated walls in work areas.

- **Work Category 26A—Electrical**

Allowance #1: \$5,000 for firestopping of existing conduits/wiring through rated walls in work area.

Allowance #2: Include re-support of up to 500 lineal feet of existing conduits that aren't found to be properly supported.



- **Work Category 28A—Technology**

Allowance #1: \$2,500 for firestopping of existing conduits/wiring through rated walls in work area.

Allowance #2: Include re-support of up to 500 lineal feet of existing conduits/wires that aren't found to be properly supported.

1.2 UNIT PRICES

A. Unit Prices: The following unit prices will be used to establish rates for extra work and/or evaluation of bids by the CM.

- **Work Category 07A— Siding/Fascia/Soffit/Gutter & Downspout**

Unit Price #1: Lineal foot cost to replace aluminum siding.

Unit Price #2: Lineal foot cost to replace aluminum fascia.

Unit Price #3: Square foot cost to replace perforated aluminum soffit.

- **Work Category 26A—Electrical**

Unit Price #1: Lineal foot cost to add/delete conduit support from the 500 If that is to be included in the base bid of this work category.

- **Work Category 28A—Technology**

Unit Price #1: Lineal foot cost to add/delete conduit/wire support from the 500 If that is to be included in the base bid of this work category.

1.3 ALTERNATES

- A. Definition: An Alternate is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.
- B. Provide alternate costs for inclusion in Contract Sum.
- C. Alternates will be exercised at Owner's option.
- D. Alternates are to include all labor, materials, equipment, and overhead/profit required to complete the work outlined in the documents.
- E. Schedule: No additional calendar days will be added to the duration of the project should alternates be accepted.



F. Description of Alternates:

- **Work Category 07A- Siding/Fascia/Soffit/Gutter & Downspout**

Alternate #1-Remove existing aluminum siding, corner trim and j-channel from entire building. Install new vinyl siding, corners and j-channel. All existing aluminum fascia and soffit to remain. (Add alternate)

Alternate #2-Remove and replace aluminum components listed in this work category description (WC 07A) listed under Alternate #2 (Add alternate)

1.4 PRODUCT SUBSTITUTIONS

- A. Substitutions during Bidding: Only substitutions submitted and approved via written addendum PRIOR TO SUBMISSION OF BIDS.
- B. Submit substitution requests to Laux Construction via e-mail to chais@lauxconstruction.com
- C. Requests are to be submitted on the form provided in Section 01 2519.01

1.5 REQUESTS FOR INFORMATION (RFI)

- A. Definition: Request from trade contractors/vendors seeking interpretation or clarification of Contract Documents not involving Substitutions or changes to Contract Sum or Contract Time.
- B. Do not submit RFI's to request approval of Substitution, request changes involving changes to Contract Sum or Contract Time, request approval of submittals, or to submit Project Record Documents.
- C. Submit electronically via email to chais@lauxconstruction.com
- D. Questions are to be submitted no later than 2:00 pm on Friday, April 12, 2024.

1.6 CONTRACT MODIFICATION PROCEDURES

- A. Architect's Supplemental Instructions: Design Professional will advise of minor changes in Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract.
- B. Bulletins:
 - 1. Construction Manager may issue a bulletin detailing a proposed change with supplemental or revised Drawings and Specifications.
 - 2. Submit estimate of any change to Contract Sum or Contract Time within 5 days after receipt.
 - 3. Submit electronically in Adobe PDF format.
 - 4. Do not proceed with change until a written authorization from Laux Construction is received.
- C. Contractor Proposed Changes:
 - 1. Describe proposed change, reason for change, effect on Work, and any changes to Contract Sum or Contract Time.
 - 2. Document proposed substitutions in accordance with Section 01 20 00.
 - 3. Submit electronically in Adobe PDF format.



- D. Construction Change Directive: Construction Manager may issue a directive, pre-approved by Owner, instructing Trade Contractor/Vendor to proceed with a change for subsequent inclusion in a Change Order.
- E. Change Orders: Change Orders will be prepared by the construction manager for signature of parties as provided in Conditions of the Contract.

1.7 SCHEDULE OF VALUES

- A. Submit Schedule of Values (for contracts totals over \$5,000) to construction manager within 5 days of receipt of contract.
 - 1. If requested, furnish data to support values given.
 - 2. Approved Schedule of Values will be used as basis for reviewing trade contractors'/vendors' Applications for Payment.
- B. Format: Use Table of Contents of Project Manual as basis for listing costs of work.
 - 1. List values in sufficient detail to serve as basis for computing values for progress payments.
 - 2. When payment is requested for stored materials, break down value into cost of materials and total installed value.
 - 3. Total of costs listed in Schedule shall equal Contract Sum.
- C. Review and Resubmittal:
 - 1. After review by Owner and CM/Design Professional, revise and resubmit if required.
 - 2. Resubmit along with next Application for Payment when Change Orders are issued. List each Change Order as new line item.

1.8 APPLICATIONS FOR PAYMENT

- A. Format: AIA Document G702 - Application and Certification for Payment, supported by AIA Document G703 - Continuation Sheet.
- B. Use data from approved Schedule of Values as basis. Provide dollar value in each column for each line item representing portion of work performed.
- C. List each authorized Change Order as separate line item.
- D. When Owner or CM/Design Professional require substantiating information, submit data justifying dollar amounts in question.
- E. Only work that has been completed or stored can be invoiced for. Projections will not be permitted on monthly pay applications.
- F. Ten (10%) percent retainage will be required on monthly pay applications.
- G. Further information regarding pay application process will be provided at the project kickoff meeting.



PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION



SECTION 01 25 19.01 - SUBSTITUTION REQUEST FORM

DATE: _____

TO: Laux Construction

ATTENTION: Chais VanDeventer chais@lauxconstruction.com

PROJECT: LSD Newcomer Center Remodeling: Bid Package 1

We submit for your consideration the following product as a substitution for the specified product:

Section No.	Paragraph	Specified Product
_____	_____	_____

Proposed Substitution:

Reason for Substitution:

Product Data:

Attach complete technical data for both the specified product and the proposed substitution. Include information on changes to Contract Documents that the proposed substitution will require for its proper installation.

Samples:

Attached Will be furnished upon request

Does the substitution affect dimensions shown on Drawings?

No Yes (explain)

Effects of proposed substitution on other Work:

Differences between proposed substitution and specified Product:



Manufacturer's warranties of the proposed substitution are:

Same Different (explain)

Maintenance service and spare parts are available for proposed substitution from:

Previous installations where proposed substitution may be seen:

Project: _____ Project: _____

Owner: _____ Owner: _____

Architect: _____ Architect: _____

Date Installed: _____ Date Installed: _____

Cost savings to be realized by Owner, if proposed substitution is approved:

Change to Contract Time, if proposed substitution is approved:

No Change Add _____ days Deduct _____ days

Submittal constitutes a representation that Contractor has read and agrees to the provisions of Section 01 20 00.

Submitted by Contractor:

Firm Name _____ Date _____

Name _____ Signature _____



For Use by Design Professional:

Based on the information supplied by the Contractor the Design Professional has reviewed the proposed substitution on the basis of design concept of the Work and conformance with information given in Contract Documents.

Approved Approved as Noted Rejected

Submit Additional Information:

Firm Name _____

Date _____

Name _____

Signature _____



SECTION 01 50 00.01 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 CONSTRUCTION FACILITIES AND UTILITIES

- A. Field Offices and Sheds: Areas within existing building/on site designated by Owner may be used for field office and storage of materials.
- B. Temporary Sanitary Facilities: Laux Construction will provide temporary sanitary facilities
- C. Temporary Electricity: Connect to existing electrical system. Cost of electricity will be paid for by Owner.
- D. Temporary Water: Use existing water source for construction operations. Costs of water used will be paid for by Owner.
- E. Temporary Lighting: Temporary lighting will be provided by the EC.
- F. Temporary Heat: Not Used
- G. Temporary Ventilation: Ventilate areas to facilitate curing of materials, disperse humidity, and prevent accumulations of dust, fumes, vapors, or gases. Use existing ventilation equipment.
- H. Temporary Telephone: Provide temporary telephone service during construction.

1.2 TEMPORARY CONTROLS

- A. Water Control: Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Erosion and Sediment Control: Provide temporary measures including silt fences, dikes, berms, settlement basins, and drainage systems to prevent water flow and sedimentation.
- C. Dust Control: Minimize dust from construction operations. Prevent dust from dispersing into atmosphere.
- D. Mold and Mildew Control:
 - 1. Prevent formation of mold and mildew on surfaces within interior of structures.
 - 2. Do not install materials sensitive to mold and mildew growth until protection can be provided.
 - 3. Promptly remove and replace materials exhibiting mold and mildew growth.

1.3 TEMPORARY PROJECT SIGN

- A. Not used

1.4 REMOVAL

- A. Remove temporary facilities and controls when construction needs can be met by use of permanent construction or upon completion of Project.



PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION



General Requirements for All Trades

Schedule

- Preliminary schedule dated 04/01/2024.

Work by Others

- The construction manager will provide the following:
 - All dumpsters for debris generated by construction activities.
 - Temporary Fire Extinguishers
 - Outhouses
 - Temporary partitions
 - Building permit from SOM BCC
 - Third party soils and materials testing
 - Cleaning laborer for undefinable debris.
 - Final cleaning

Supervision of Work

- Construction manager will provide an on-site superintendent that will be responsible for scheduling and coordination of all on-site activities, quality control, and safety enforcement.
- Each contractor is to assign a foreman/superintendent that will be responsible for all work performed for their WC. This person is to be on-site when work is being performed and is solely responsible for any 2nd/3rd tier subcontractors contracted to perform any tasks under this WC.

Safety

- All contractors will be required to submit a copy of their company safety plan within 5 working days of notice of award.
- All workers will be required to wear work boots, sleeved shirt (short sleeve minimum), long pants, hard hats, and safety glasses.
- All workers will be required to be equipped and use any PPE required for the task they are performing.



- All workers using lifts or other motorized equipment must be trained and certified for the specific piece of equipment they are using. Certification cards must be on their person at time of use.
- Ladders are to be in good condition, compliant for the work they are being used for, and workers are to use proper safety.
- All workers are to follow OSHA/MiOSHA standards for safety.
- Any worker refusing to comply with safety standards/expectations will be removed from the site.

Clean up/Site Organization

- All workers are to provide a means of securing and storing tools on site. Any tools not in use are to be stored in a secure location.
- All workers are to maintain an orderly site free of trip hazards, falling materials, excessive clutter, etc.
- All trades are to provide regular clean up of debris generated by their work (definable). Debris to be placed in a dumpster on site provided by the construction manager.
- Laux Construction will provide a cleaning laborer for debris that is not directly associated with trade work (undefinable).
- Should the construction manager be required to perform definable cleaning, the cost of these efforts will be back charged to the WC responsible for the debris.

Conduct

- There is to be no tobacco use on this campus throughout the duration of the project. This includes vaping, chewing tobacco, e-cigarettes, and cannabis.
- Workers are to refrain from horseplay.
- Workers are to refrain from using profane language and/or displaying any offensive messages/language on their person, tool storage, hard hats, clothing, etc.

Construction Management Software

- The construction manager will provide free access to Procore project management software to all stakeholders of the project.
- All contractors are required to utilize Procore for submittals, RFI's, and closeout documents.



Submittals

- Shop drawings and product data are to be submitted to the construction manager via Procore.
- The construction manager will issue submittal packages to each work category that will include submittals required for the project.
- Contractors will have access to all submittals for the project, via Procore, and will be expected to coordinate with other trade's submittals as necessary to perform their work.
- Required finish samples are to be hand delivered/mailed to the office of the construction manager. Sample cards can be used for preliminary selections; however, actual/physical samples are to be provided for verification.
- Any work installed without reviewed submittals will be at the risk of the contractor installing the work. The CM, AE, or owner will not be held responsible for any materials that do not comply with the documents and/or have been processed as a submittals and reviewed by all parties.
- Submittal packages for closeout materials will be issued shortly after the PD/SD process is underway. Contractors are responsible for submitting closeout materials by the deadline noted in the submittal package.
- As-builts, start up reports, TAB reports, final inspection approvals, etc. will be due at the end of the project at a date/time to be established by the construction manager.

RFI's

- Any requests for interpretation of the documents or additional information from contractors is to be directed to the construction manager via Procore.

Meetings

- The construction manager will host weekly progress meetings at a time and location to be determined at the project site.
- A representative from each contractor is to be in attendance at each progress meeting and be prepared to discuss status of material deliveries, schedule, coordination with other trades, etc.

Warranty

- In addition to manufacturer's warranties, all work categories are to include a one-year warranty on all labor and materials provided under this contract.
- Warranty will begin at the date of substantial completion.

END OF GENERAL REQUIREMENTS

LSD Newcomer Center Remodeling

Mon 4/1/24

ID	Task Mode	Task Name	Duration	Start	Finish	June 2024							July 2024							August 2024																							
						1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	1	2	4	6	8	10	12
1		Mobilize	1 day	Mon 6/3/24	Mon 6/3/24																																						
2		Temp Protect	1 day	Mon 6/3/24	Mon 6/3/24																																						
3		Arch. Demo	10 days	Tue 6/4/24	Mon 6/17/24																																						
4		MEP Demo	10 days	Thu 6/6/24	Wed 6/19/24																																						
5		Ext. Concrete	5 days	Thu 6/20/24	Wed 6/26/24																																						
6		New Openings	5 days	Tue 6/18/24	Mon 6/24/24																																						
7		Rough MEP	10 days	Thu 6/20/24	Wed 7/3/24																																						
8		Repair Finishes	10 days	Thu 7/4/24	Wed 7/17/24																																						
9		Prime & 1st Coat	5 days	Thu 7/18/24	Wed 7/24/24																																						
10		Final MEP	10 days	Thu 7/25/24	Wed 8/7/24																																						
11		Siding Repair	5 days	Tue 6/25/24	Mon 7/1/24																																						
12		Flooring	8 days	Thu 8/8/24	Mon 8/19/24																																						
13		Doors/Frames/HW	3 days	Tue 8/20/24	Thu 8/22/24																																						
14		Windows	3 days	Tue 8/20/24	Thu 8/22/24																																						
15		Final Inspections	1 day	Fri 8/23/24	Fri 8/23/24																																						
16		Punchlist	1 day	Fri 8/23/24	Fri 8/23/24																																						
17		Turnover	1 day	Fri 8/23/24	Fri 8/23/24																																						



Work Category 02A: Demolition and Abatement

Sections Included:

- Division 01 General Requirements
- 024119 Selective Demolition

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Provide legal, off-site disposal of all debris generated by this work category.
2. Provide containment and dust control measures required to prevent spread of dust/debris/contaminants outside of immediate work areas.
3. Provide protection of HVAC system from intake of airborne dust/debris.
4. Provide temporary protection of surrounding finishes/fixtures to remain (Plastic/Masonite/ramboard,etc.)
5. Provide shoring as necessary at areas of structural demo. Leave shoring in place until completion of structural work. Remove when structural work is complete.
6. Demolition work associated with the following keynotes on D1.1: 1A, 1C, 2A, 2B, 4A, 4B, 5A, 6A, 6B, 7A, 8B, 8C, 9A, 9B, 9C, 9D

Exclusions/Work by Others:

1. Temporary board up of window and door openings (WC 09A)
2. Work related to exterior fascia, soffit, siding, and gutters/downspouts (WC 07A)
3. Patching of surrounding finishes.
4. Concrete sawcutting & removal (by respective MEP trades needing removal of concrete to complete their work).
5. Removal of door hardware from doors to remain (by WC 09A)
6. Cut/cap/make safe MEP work (by WC's 23A and 26A)
7. Removal of fire alarm devices or wiring (by WC 26A)
8. Demo of any technology/security items (by WC28A)
9. Excavation/earthwork/site demo (by WC 03A)



Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. \$5,000.00 to be used at Owner's discretion.

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 03A: Concrete/Sitework

Sections Included:

- Division 01 General Requirements
- 031000 Concrete Forming and Accessories
- 032000 Concrete Reinforcing
- 033000 Cast in Place Concrete
- 079200 Thermal Insulation (partial scope only)

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Concrete work associated with the following keynotes on A1.1: 4, 12
2. WC 03A will excavate and prep for new concrete stoop and concrete pad for mechanical equipment.
3. Subbase will be furnished, installed, and graded to within +/- .10' by WC 03A. This WC to perform any fine grading required prior to installation of their work.
4. Construct 4'x5'x4" concrete stoop W/ turn down edges.
5. Construct 4'x16'-6"x4" concrete pad for site mechanical equipment. Provide 24" clearance on all sides. Coordinate with mechanical drawings.
6. Furnish and install expansion material and (3) #5 greased bars to tie concrete stoop into building.
7. Provide means of transporting concrete to all areas of building and site as necessary.
8. Provide surveying/layout/staking at necessary for concrete pad and stoop placement.

Exclusions/Work by Others:

1. Patching of concrete floor slab where removed to install UG plumbing (by WC 22A)
2. Patching of floor registers where removed (by WC 09B)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. \$10,000 for restoration and seeding due to damage to site during construction process.



Lansing School District
Newcomer Center Remodeling-BP 1
Work Category Description

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 07A: Siding/Fascia/Soffit/Gutter & Down Spout

Sections Included:

- Division 01 General Requirements
- 079200 Joint Sealants (related to scope of this WC only)

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. This work category is to provide a cost to remove and install the following:
 - a. Aluminum fascia: 50 lft
 - b. Aluminum soffit (perforated): 100 sft
 - c. Aluminum gutter: 260 lft
 - d. Aluminum downspout: 80 lft
2. Attend pre-installation meeting onsite with owner/CM to review existing aluminum siding, fascia, and soffit. Exact scope of work to be confirmed at this meeting.
3. Allowance is to cover any adjustments to the scope of work discussed and agreed upon at the pre-installation meeting.
4. Unit prices (below) are to be used to determine cost per discussion of notes 1 and 2 above.
5. Replace all existing gutter and downspouts. Match existing material, size, and profile.
6. Replace portions of fascia and soffit as determined during pre-installation meeting onsite.
7. Furnish and install fascia, soffit, gutter, and downspout per manufacturers recommendations and industry standards.
8. Match existing materials and colors. (provide physical samples for color matching)
9. Include means of access (ie. scaffold, lifts, etc.)
10. Apply joint sealants @ joints between materials provided by this WC, as required.
11. Power wash entire building upon completion of work

Exclusions/Work by Others:

1. Roofing and roof patch (By WC 07B – Roofing)

Allowances:

1. \$25,000 to be used at the Owner's discretion



Alternates:

1. Remove existing aluminum siding, corner trim and j-channel from entire building. Install new **vinyl** siding, corners and j-channel. All existing aluminum fascia and soffit to remain. Include means of access (i.e. lift rental, scaffold, etc.) Do not include costs to replace aluminum fascia, soffit, gutter and downspouts already in base bid for this work category.

2. Remove and replace the following aluminum components:
 - a. Aluminum siding (Double 4): 500 lft
 - b. Aluminum Corner trim: 100 lft
 - c. Aluminum J-channel at openings: 310 lft

Unit Prices: Unit provide cost below to be all inclusive and include means of access (lift rental, scaffold, etc.)

1. Unit Price #1: Lineal foot cost to replace aluminum siding.
2. Unit Price #2: Lineal foot cost to replace aluminum fascia.
3. Unit Price #3: Square foot cost to replace perforated aluminum soffit.

END OF WORK CATEGORY



Work Category 07B: Roofing

Sections Included:

- Division 01 General Requirements
- 079200 Joint Sealants (related to scope of this WC only)

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Flash and provide roofing around penetrations and curbs created/added by WC 22A and 23A.
2. Roofing work associated with the following keynotes on MD1.1: Z2, Z5
3. Roofing work associated with the following keynotes on M1.1: H1, H2, H5, H7, H16
4. Match existing roofing materials.
5. Apply joint sealants @ joints between materials provided by this WC.
6. Provide samples and product data of materials prior to procuring.

Exclusions/Work by Others:

1. Vent piping (by WC 22A)
2. Curb cap and relief hood curb (by WC 23A)

Allowances:

1. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 08A: HM Doors/Frames/Wood Doors/Hardware

Sections Included:

- Division 01 General Requirements
- 081113 Hollow Metal Doors and Frames
- 081416 Flush Wood Doors
- 087100 Door Hardware (Partial Scope)
- 088000 Glazing

Specific Notes/Scope:

1. Furnish HM doors and frames (WC 09A to install).
 2. Furnish Wood doors (WC 09A to install).
 3. Furnish hardware for HM doors and wood doors only (WC 09A to install).
 4. Furnish Glazing for all HM and wood doors if specified.
 5. Furnish door hardware associated with HM and wood doors only. Turn over cores to CM for keying by LSD's lock shop.
-

Exclusions/Work by Others:

1. Keying of lock cores (by LSD)
2. Hardware associated with aluminum doors, windows, and storefronts (by WC 08B)
3. Door lite kits in AL. doors (by WC 08B)
4. Install of frames, HM doors, wood doors, and hardware (by WC 09A)
5. Access doors and frames (by WC 09A)
6. Access controls (by WC 26A)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 08B: Aluminum Windows and Storefronts

Sections Included:

- Division 01 General Requirements
- 079200 Joint Sealants (Partial Scope)
- 084113 Aluminum Framed Entrances and Storefronts
- 088000 Glazing

Specific Notes/Scope:

1. Furnish and Install Aluminum framed entrances, doors, and storefronts.
2. Furnish and install hardware for aluminum doors and storefronts.
3. Furnish and install Glazing for all aluminum doors if specified.
4. Perform interior and exterior perimeter caulking of all aluminum doors and storefronts installed by this WC.

Exclusions/Work by Others:

1. Keying of lock cores (by LSD)
2. Hardware associated with HM doors and wood doors (by WC 08A)
3. Door lite kits in HM and wood doors (by WC 08A)
4. Wood blocking at window and door openings (by WC 09A)
5. Install of frames, HM doors, wood doors, and hardware (by WC 09A)
6. Access controls (by WC 26A)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 09: Carpentry & Interiors

Sections Included:

- Division 01 General Requirements
- 024119 Selective Demolition (as related to door hardware only)
- 061053 Miscellaneous Rough Carpentry
- 061600 Sheeting
- 072100 Thermal Insulation
- 078413 Penetration Firestopping
- 078446 Fire Resistive Joint Systems
- 079200 Joint Sealants (related to this scope of work only)
- 081113 Hollow Metal Doors and Frames (Installation only)
- 081416 Flush Wood Doors (Installation only)
- 083113 Access Doors and Frames
- 085200 Wood Window (Furnish and installation)
- 087100 Door Hardware (HM and Wood installation only)
- 088000 Glazing (Partial)
- 092900 Gypsum Board

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Remove existing door hardware from doors that are scheduled to remain and turn over to owner for salvage. This is to be completed prior to start of demolition activities by WC 02A.
2. Salvage/preservation/prep work associated with the following keynotes on D1.1: 3A, 3B, 3C, 5A, 5B, 9A, 9B, 9C, 9D. (Demolition by WC 02A)
3. Temporary board up of windows and door openings
4. Provide and install all wood backing and blocking for all items mounted on metal framed partitions, including, but not limited to plumbing fixtures, bath accessories, bath partitions, smart boards, VDB's, etc.
5. Provide and install all wood backing and blocking at window and door openings as noted on plans.
6. Work associated with the following keynotes on A1.1: 1, 2, 3, 5, 6, 7, 8, 13, 14, 15, 17.
7. Work associated with the following keynote on EP1.1: R2.
8. Patch walls and ceiling where necessary from WC 02A demolition activities.
9. Receive and install HM frames, HM doors, wood doors, and all associated hardware (provided by WC 08A)
10. Furnish and install access doors and frames.
11. Furnish and install wood windows and insect screens.
12. Furnish and install wood trim for windows as shown on sheet A6.2.



13. HM frames, HM doors, woods doors, and wood windows caulking to be on this WC.
14. Perform patching of drywall where plumber is installing in-wall plumbing (Refer to P sheets).
15. Provide and install insulation @ window openings.
16. Provide spray fireproofing, top of wall firestopping, and continuous firestopping sealant @ gyp.
17. Provide joint sealants directly related to scope of this work only (ie, acoustic sealants, etc.).
18. Perform all modifications, repairs, and prep work required at existing frames to remain.
19. Hang, finish, and sand all gyp bd.
20. Patch and sand holes, dents, and rough areas at existing gyp bd to remain in work areas.
21. Provide containment and protection of surrounding areas during drywall finishing and sanding activities to prevent spread of dust and debris to other areas/finishes.
22. Upon completion of sanding activities, perform a thorough cleaning of all debris and dust generated by these activities. Vacuum dust from all surfaces utilizing a HEPA vac.
23. Touch up gyp bd after priming activities are completed by WC 09C.
- 24. Patch all holes in draft stop walls located in attic.**
25. Provide and install suspended ceiling and hard lid ceilings.
26. Patch all drywall ceiling affected by MEP trades.
27. Provide removal and reinstallation of ceiling grid/tile in areas scheduled to remain where MEP/Tech trades need to access space above for their work.

Exclusions/Work by Others:

1. Doors/Frames/Hardware materials (by WC 08A)
2. Installation of aluminum doors/aluminum frames/aluminum hardware (by WC 08B).
3. Firestopping of penetrations for MEP work.
4. Application of filler (ie, Bondo) and painting prep @ door frames (By WC 09C).

Allowances:

1. \$10,000 to be used at Owner's discretion.

Alternates:

1. None

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 09B: Floor Coverings

Sections Included:

- Division 01 General Requirements
- 093000 Metal Transition Accessory
- 096513 Resilient Base and Accessories
- 096519 Resilient Tile Flooring
- 096723 Resinous Flooring
- 096813 Tile Carpeting

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Perform preparation of floor slab as required by manufacturers' recommendations.
2. Patch and prep floors due to demo activities, see sheet D1.1.
3. Work associated with the following keynotes on A1.1: 11, 16.
4. Infill floor where floor registers and diffusers are removed by WC 23A.
5. Provide and install all floor coverings per manufacturers' instructions, including:
 - a. Ceramic Tiling (WT-1, 2, and 3)
 - b. Resilient Tile Flooring (LVT-1)
 - c. Resinous Flooring (REF-1)
 - d. Tile Carpeting (CPT-W)
6. Provide and install all resilient base and accessories (RB-1), (RT)

Exclusions/Work by Others:

1. Demolition of existing floor coverings (by WC 02A).

Allowances:

1. \$3,500 for floor leveling exceeding manufacturers minimum recommendations.

Alternates:

1. NOT USED

Unit Prices:

1. Square foot cost to add 1/8" floor leveling product in areas receiving new flooring.

END OF WORK CATEGORY



Work Category 09C: Painting

Sections Included:

- Division 01 General Requirements
- 079200 Joint Sealants (partial)
- 099124 Interior Painting (MPI Standards)
- 099600 High-Performance Coatings

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Provide complete protection of all surrounding finishes and surfaces during execution of scope under this WC. Clean up of any overspray, spillage, etc. will be the responsibility of this WC.
2. Provide and install caulk @ perimeter of hollow metal door frames (interior and exterior).
3. Apply one coat of primer to new gypsum board surfaces. Upon completion of priming activities, this WC is to mark any areas of concern (ie, defects, rough area, dents, etc.). WC 09A will patch and sand these areas ONE TIME.
4. Apply finish paint to gypsum board per specs.
5. Apply filler material (i.e, bondo) over heads of HM frame anchors (ground down by WC 09A) and over slush holes in frames. Sand and prep for paint.
6. Paint hollow metal frames and doors. This WC to confirm compatibility of finish paint with factory primer.
7. Work associated with the following color notes on A8.1: 1,2, 3, 4, 5, 6, 7, 8, 9
8. Work associated with the following keynote on M1.1: H13
9. Prep and paint existing frames to remain. WC 09A will perform any major modifications/repairs. Painting WC to perform final touch ups/prep of frame prior to painting.
10. Paint exterior surfaces as noted in plans.
11. Painting of gas piping for HVAC work.

Exclusions/Work by Others:

1. NOT USED

Allowances:

1. NOT USED
-



Lansing School District
Newcomer Center Remodeling-BP 1
Work Category Description

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 10A: Specialties

Sections Included:

- Division 01 General Requirements
- 101100 Visual Display Units
- 101423.16 Room Identification Panel Signage
- 102113.17 Phenolic-Core Toilet Compartments
- 102600 Wall and Door Protection
- 102800 Toilet, Bath, and Laundry Accessories
- 104413 Fire Protection Cabinets
- 104416 Fire Extinguishers
- 105113 Metal Lockers
- 122413 Roller Window Shades

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Field verify all dimensions prior to placement of orders.
2. Provide and install all materials for this work category.
3. Install owner furnished items noted below.

Exclusions/Work by Others:

1. Wood blocking/backing (by WC 09A).
2. TV (by owner)
3. Paper towel, toilet paper, and soap dispenser materials (by owner).

Allowances:

1. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 22A: Plumbing

Sections Included:

- 024119 Selective Demolition (partial scope)
- 031000 Concrete Forming and Accessories (partial scope)
- 032000 Concrete Reinforcing (partial scope)
- 033000 Cast-in-Place Concrete (partial scope)
- 078413 Penetration Firestopping (related to plumbing only)
- 079200 Joint Sealants (related to plumbing only)
- 220005 Basic Plumbing Requirements
- 220505 Selective Demolition for Plumbing
- 220519 Meters and Gauges for Plumbing Piping
- 220523 General-Duty Valves for Plumbing Piping
- 220553 Identification for Plumbing Piping and Equipment
- 220719 Plumbing Piping Insulation
- 221005 Plumbing Piping
- 221006 Plumbing Piping Specialties
- 221123 Domestic Water Pumps
- 223000 Plumbing Equipment
- 224000 Plumbing Fixtures
- Div 22 P Sheets

Specific Notes/Scope:

1. Provide plumbing permit and inspections by SOM BCC.
 2. Work associated with the following keynotes on D1.1: 1B, 8A, 9B.
 3. Work associated with the following keynotes on PD1.1: Y1, Y2, Y3, Y4, Y5, Y6
 4. Work associated with the following keynotes on P1.1: P1, P3, P5, P6, P7, P8, P9, P10
 5. Furnish and install materials/equipment as noted in division 22 specs and on P sheets.
 6. Field verify location of existing tie-in in women's restroom prior to start of work.
 7. Sawcut and remove concrete from women restroom to tie into existing sanitary line. Include temporary protection measures necessary to minimize dust and contain to the area of work. Cover surrounding finishes to protect from slurry and perform thorough cleaning of this area after concrete removal.
 8. Install UG sanitary piping and tie into existing, including all excavation, backfill, and compaction of soils. Assume that existing soils are suitable for backfill.
 9. Patch concrete slab where removed to install UG piping. Coordinate with WC 09B prior to placement of concrete.
 10. Demo existing plumbing fixtures and piping.
 11. Furnish and install plumbing vents. Coordinate installation of vents with WC 07B.
 12. Install penetration firestopping at any penetrations related to this scope of work.
-



Exclusions/Work by Others:

1. Gas piping (by WC 23A)
2. Condensate Drains (by WC 23A)
3. Electrical connection to EWC (by WC 26A)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. \$2,500 for firestopping of existing plumbing piping through rated walls in work areas.

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 23A: HVAC

Sections Included:

- 078413 Penetration Firestopping
- 230005 Basic HVAC Requirements
- 230505 Selective Demolition for HVAC
- 230553 Identification for HVAC Piping and Equipment
- 230593 Testing, Adjusting, and Balancing for HVAC & Plumbing
- 230713 Duct Insulation
- 230925 Direct-Digital Control (DDC) Systems for HVAC
- 231123 Natural-Gas Piping
- 233100 HVAC Ducts and Casings
- 233300 Air Duct Accessories
- 233423 HVAC Power Ventilators
- 233700 Air Outlets and Inlets
- 235400 Furnaces
- 236313 Air Cooled Refrigerant Condensers
- 238200 Convection Heating and Cooling Units
- Div 23 M Sheets

Specific Notes/Scope:

1. Provide mechanical permit and inspections by SOM BCC.
2. Furnish and install materials/equipment as noted in division 23 specs and on M sheets.
3. Work associated with keynotes on MD1.1: Z1, Z2, Z3, Z4, Z5, Z7, Z8, Z9.
4. Provide curbs and caps as required (WC 07A to flash)
5. All work penetrating the roof will be on this WC, all flashing will need to be coordinated and performed by WC 07A.
6. Work associated with keynotes on M1.1: H1, H2, H4, H5, H7, H8, H9, H10, H11, H12, H13, H14, H15, H16.
7. Furnish and install materials/equipment as noted in division 23 specs and on M sheets.
8. Use SC Tech for controls
9. Furnish and install RTU as detailed on equipment schedule.
10. Furnish and install all piping required by mechanical schedule.
11. Furnish and install HVAC controls and associated wiring and tie into existing BAS. Update graphics with new points.
12. Furnish and install GRD's.
13. Furnish and install new furnaces.
14. Furnish and install new condensing units.
15. Furnish and install new electric tampering coils.
16. Furnish and install new exhaust fans.



17. Furnish and install new intake and relief hood.
 18. Furnish and install new electric heaters.
 19. Apply firestopping to any penetrations related to this scope of work in rated assemblies.
 20. Caulk any penetrations through walls related to this WC.
 21. Perform factory start-up of equipment and submit written and signed start up reports with closeout documents.
 22. Permanent HVAC equipment may be used upon thorough clean-up of drywall dust with HEPA filter vac and application of primer to walls. This WC to provide (1) filter change during the finishing stages of construction. Upon completion of project and immediately prior to occupancy, install new filters.
 23. Perform training of owner's staff on operation of units and preventative maintenance activities.
 24. Perform test and balance and submit report with closeout documents.
-

Exclusions/Work by Others:

1. Removal and replacement of existing ceilings (by WC 09A)
2. Roof flashing at curbs (by WC 07A)
3. Painting of gas piping (by WC 09B)
4. Line voltage and connections to equipment (by WC 26A)
5. Concrete condenser pad (WC 03A)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. \$2,500 for firestopping of existing plumbing piping through rated walls in work areas.

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY



Work Category 26A: Electrical

Sections Included:

- 078413 Penetration Firestopping (partial scope)
- 079200 Joint Sealants (partial scope)
- 260005 Basic Electrical Requirements
- 260505 Selective Demolition for Electrical
- 260519 Low-Voltage Electrical Power Conductors and Cables
- 260526 Grounding and Bonding for Electrical Systems
- 260529 Hangers and Supports for Electrical Systems
- 260533.13 Conduit for Electrical Systems
- 260533.16 Boxes for Electrical Systems
- 260533.23 Surface Raceways for Electrical Systems
- 260553 Identification for Electrical Systems
- 260935 Distributed Digital Lighting Control System
- 262416 Panelboards
- 262726 Wiring Devices
- 262816.16 Enclosed Switches
- 265100 Interior Lighting
- 265600 Exterior Lighting
- 284600 Fire Detection and Alarm

Specific Notes/Scope:

1. Provide product data/shop drawing submittals separated by specification sections. Submittals with multiple sections grouped together as one file will not be accepted.
2. Provide electrical permit and inspections by SOM BCC.
3. Furnish, install, and maintain temporary lighting throughout work site. Relocate as necessary to facilitate work by other trades. Lighting level and system to meet all MiOSHA standards.
4. Establish temporary power source to be used by all WC's during construction. Remove upon completion of project.
5. Complete all electrical demolition as outlined on ED101.
6. Remove and salvage existing fire alarm devices that can be used for reuse. Coil back FA wiring in ceiling and protect.
7. Work associated with the following keynotes on ED1.1: D1, D2, D3, D4
8. Work associated with the following keynotes on ED2.1: D1, D2, D3, D4
9. Furnish and install new Branch Panel.
10. Furnish and install all conduit and boxes for wiring installed by this WC. Coordinate with WC 09B for painting of exposed conduit.



11. Furnish and install all line voltage wiring, devices, and cover plates.
12. Connect line voltage to plumbing and HVAC equipment.
13. Furnish and install all light fixtures as scheduled.
14. Furnish, install, and program all lighting controls.
15. Provide a complete fire alarm system, including wiring, devices, programming, and certification.
Coordinate with CM for demonstration for BCC and BFS inspectors.
16. Submit fire alarm drawings to BCC/BFS for approval.
17. Provide complete cabling system for technology scope, including wiring, supports, racks, cabinets, devices, terminations, labeling, testing, and training. (Refer to sheet E0.0 – Note 1.
18. Provide complete audio and video system including wiring, equipment, testing, and training.
Apply firestopping to any penetrations related to this scope of work in rated assemblies.
19. Caulk any penetrations related to this WC through non-rated walls.
20. Perform training of owner's staff on all components and equipment provided by this WC.

Exclusions/Work by Others:

1. Flashing of roof penetrations (by WC 07A)
2. Painting of exposed conduit (by WC 09B)
3. HVAC controls and associated wiring (by WC 23A)

Allowances:

Allowances are to be utilized at the owner's discretion and by their authorization only.

1. \$2,500 for firestopping of existing conduits/wiring through rated walls in work area.

Alternates:

1. NOT USED

Unit Prices:

1. Include re-support of up to 500 lineal feet of existing conduits/wires that aren't found to be properly supported.

END OF WORK CATEGORY



Work Category 28A: Technology

Sections Included:

- Division 01 General Requirements
- Division 26 E Sheets
- Division 28 Electronic Safety and Security (All)

Specific Notes/Scope:

The following is to be used for clarification of the intent of this work category. This is not a comprehensive list of scope items and work category will be responsible to provide all work for the sections listed above.

1. Provide permits as required by SOM BCC and BFS.
2. WC responsible for Technology Symbol List on E0.0
3. Remove and salvage any existing security cameras. Coil back wiring in ceiling and protect.
4. Furnish and install complete access control system as specified. Coordinate installation of this system with WC 09A, 08A, and 08B door and hardware installation.
5. Furnish and install complete video security system as specified, including wiring, supports, cameras, software, hardware, programming, testing, adjustments, and training.
6. Furnish and install complete paging system as specified, including cabling, speakers, amplifiers, software, configuration, labeling, testing, and training.
7. Furnish and install complete clock system as specified, including clocks, wiring, labeling, testing, and training.
8. Provide firestopping of all penetrations through rated walls for low voltage wiring provided by this WC.
9. Provide training of owner's staff on all systems provided under this WC.

Exclusions/Work by Others:

1. HVAC controls and wiring (by WC 23A).
2. Power wiring (by WC 26A).
3. Fire alarm (by WC 26A)



Allowances:

1. \$2,500 for firestopping of existing tech/data-com/access control/security (non-line voltage) conduits/wiring through rated walls in work areas.
2. Include re-support of up to 500 lineal feet of existing conduits/wires that aren't found to be properly supported.

Alternates:

1. NONE USED

Unit Prices:

1. Lineal foot cost to add/delete conduit/wire support from the 500 lf included in the allowance.

END OF WORK CATEGORY



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SUBCONTRACTOR AGREEMENT

Contract Date:

Job No: 24019

Subcontractor:

Project Name: LSD-Newcomer Center Remodeling

ARTICLE 1 – WORK

- The Subcontractor is bound to Laux Construction, LLC (Laux) by the terms of this Subcontractor Agreement and all bidding documents, General Conditions, and/or Special Conditions related to the above-listed project, except as modified herein. The subcontractor assumes toward Laux, except as specially stipulated to the contrary, all obligations and responsibilities that Laux, by said documents, assume towards the project owner. The subcontractor agrees to provide all labor, materials, tools, equipment, transportation, supervision, insurance, taxes, permits, fees, and other things necessary to complete the above-listed project according to all bidding documents.
 - Project Manual by Laux Construction, dated April 5, 2024
 - Drawings by Kingscott, dated March 22, 2024
 - Technical Specifications by Kingscott, dated March 22, 2024

Inclusions: The work includes but is not limited to the following scope of work:

- Per the attached quote dated "TBD"
- Per the attached post-bid interview held on "TBD"

ARTICLE 2 – CONTRACT PRICE

- Work must be approved and accepted by Laux and Owner; Contractor shall pay to Subcontractor:

CONTRACT PRICE: _____ *Dollars 00/100* **\$0.00**

ARTICLE 3 – CONTACT INFORMATION/LINES OF COMMUNICATION

- All communication/correspondence from subcontractors must be directed to Laux. Subcontractors are not to contact the owner/architect directly for any reason.

Laux Project Manager / Emergency Contact (RFI's, submittals, etc.):
Chais VanDeventer

Laux Project Controller (Pay Applications, Contracts, Certified Payroll, General Billing Questions):
Kitty Gailey

Laux Site Superintendent (scheduling, site issues, site access, etc.):
TBD

ARTICLE 4 – ASSIGNMENT

- The Subcontractor shall **not** assign or sublet the performance of its obligations under this Agreement/Order without the prior written consent of Laux Construction. Submit all Second-Tier subcontract requests to Laux Construction in writing prior to Second Tier Subcontractor performing any work on site. Failure to request Second Tier Subcontractor approval will result in Breach of Contract.



ARTICLE 5 – PROJECT SCHEDULE

- Laux Site Superintendent will handle the scheduling of all work and will contact each subcontractor individually. A printed schedule will be forwarded periodically via e-mail/fax.
- Subcontractor is expected to be on-site at the date and time determined by Laux Site Superintendent. Please contact Laux Site Superintendent twenty-four (24) hours in advance if there is a change in arrival time.
- Workers are to notify Laux Site Superintendent when leaving the site for any reason.
- Subcontractor is to arrive at the site on time/as scheduled and prepared with a proper number of workers needed to complete work as scheduled. The subcontractor is to arrive at the site fully prepared with security clearances, permits (if required), and all tools and equipment necessary to complete their work as scheduled by Laux.
- Subcontractor agrees to expeditiously perform its obligations and fully staff the project always. The subcontractor acknowledges receipt of the construction schedule and agrees that it may be modified from time to time with forty-eight (48) hours' notice. Subcontractor agrees that by commencing the physical on-site work, that it has accepted the site and the work of any prior subcontractors, suppliers, or tradespeople, and that the site is acceptable for its performance.

ARTICLE 6 – PROJECT PROCEDURES

- No payments will be made to subcontractors until this agreement is signed and returned to Laux.
- Contract Price includes all applicable state sales and use taxes
- Submittals
 - Submittals to be forwarded to Laux via e-mail in PDF format
 - Three (3) sets of samples to be forwarded to the Project Manager listed above, at Laux Construction (if applicable)
 - Submittals shall reflect all work as specified by the project Bid Documents. Any materials or equipment installed that have not been approved through formal submittals are the responsibility of the Subcontractor. Any materials installed that do not meet the requirements of the project Bid Documents and/or were not formally submitted/approved will be removed and replaced by the Subcontractor at the sole expense of the Subcontractor and at no cost to Laux, owner, or architect. This Subcontractor Agreement assumes that all work proposed by the Subcontractor meets all criteria set forth in the project Bid Documents.
- RFI's: All RFI's to be forwarded to Laux Project Manager via email or fax
- Field Decisions/Bulletins/Change Orders
 - Subcontractor is not to proceed with any changes unless and until Laux Project Manager gives it written notice to do so. Neither Laux nor owner will pay for any changes to work performed by the Subcontractor that were not previously approved by Laux in writing.
 - To avoid any potential delays, Laux requests that pricing for any changes be forwarded with all required backup information within three (3) calendar days of issuance of the bulletin(s).
- Progress Meetings
 - Subcontractor must attend meetings as requested.
- As-Builts/Record Documents
 - Subcontractor is to keep current as-built drawings throughout the project. A set of plans designated for as-builts will be kept at the Laux field office for changes to be documented on. The subcontractor must keep these current throughout the project and will document all changes neatly in red pencil/pen.



- **Three (3) copies** of close-out documents as required by project Bid Documents will be required at end of the project. Hard copies are required for submission. Any printing costs incurred by Laux, if hard copies are not received, will be back charged to the Subcontractor.
- Close-out documents must be received by Laux two (2) weeks after the substantial completion date or by other date established by Laux Construction. If these documents are not delivered to Laux within this time frame, the subcontractor will be charged \$100.00 per day until these items are received.
- Final payment will not be made until all closeout materials are received.

ARTICLE 7 – APPLICATION FOR PAYMENTS

Laux shall pay the Subcontractor pursuant to the terms and conditions below:

- A schedule of values for your work is to be submitted to Laux Construction for review/approval.
- Monthly pay apps to be submitted to Laux Construction Project Accountant via email or fax no later than the **15th** of each month. Pay apps are to be submitted in AIA format based on the approved schedule of values.
- Laux pay applications will be submitted to the architect on the 25th of each month.
- Payment from the owner to Laux for the Subcontractor's work is a condition precedent to Laux's obligation to pay the Subcontractor for its work. Laux shall have no liability to the Subcontractor if Laux does not receive payment from the owner for the Subcontractor's work.
- Subcontractor's work must be accepted by Laux, owner, and architect/engineer prior to payment.
- **10% retainage** will be held per specifications, project manual, and/or contract with the owner.
- The Subcontractor shall be paid only if the necessary documentation has been received pursuant to Article 6 herein below, and as required by the owner and/or Laux, and upon fulfillment of the terms and conditions above and the absence of any notice of default or termination.
- Any delay which is determined to be the fault of the Subcontractor will be the basis of assessing all or part of the liquidated damages incurred. Laux may assess and deduct from any payment the Subcontractor's proportionate share of any liquidated damages assessed by the owner to Laux.
- Laux, in its sole discretion, may withhold payment, and pay over to sub-subcontractors, suppliers, or laborers if Laux reasonably believes the Subcontractor is in financial jeopardy or if the project is in jeopardy.
- **The following items need to be submitted with all monthly Pay Applications:**
 - **A Sworn Statement pursuant to Michigan's Construction Lien Act, MCL 570.1101, et seq. (CLA)**
 - **Conditional Lien Waivers for current pay application.**
 - **Lien Waivers from laborers, suppliers, and/or sub-subcontractors pursuant to the CLA**
 - **Any evidence required by the owner and/or any applicable provisions of any other construction lien law, bond law, or similar applicable law.**
 - **Certified Payroll Reports (if applicable)**
 - **Final retainage billings must be submitted on a separate payment application.**

If any of the above items is not submitted with the Subcontractor's Pay Applications, the Pay App will be rejected.

- **Final invoicing/pay applications must be submitted to Laux Construction within 30 days after subcontractor work is complete. Any invoices/pay applications submitted by subcontractor after 90 days will be null and void.**

ARTICLE 8– CONSTRUCTION SITE, FACILITIES, ETC.



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- Access to Site: Staging and access as determined by Site Superintendent/owner
- Staging Area/Material Storage/Dumpsters: As directed by the Site Superintendent/owner
- Working Hours
 - Normal working hours will be Monday through Friday, 7:00 am to 4:30 pm.
 - Any work to be done outside of this time to be approved by Laux Site Superintendent at least twenty-four (24) hours in advance
- Other
 - There will be no smoking allowed on-site
 - There will be no profane language used on-site
 - There is to be no interaction with occupants/staff by any subcontractor
 - Subcontractor to notify Laux of any utility shutdowns at least three (3) days in advance
 - Any damages to the site, facilities, layout stakes, etc. caused by the Subcontractor or its agents, employees, or independent contractors will be the responsibility of the Subcontractor and the cost to replace/repair the damage may be deducted from the Contract Price.
 - Subcontractor will take all necessary precautions to limit disturbance/damage to existing fireproofing on structural members of the site-building. Any fireproofing replacement costs caused by the Subcontractor will be back charged to the Subcontractor.
- Clean-up
 - Laux will provide a dumpster for all debris generated by this project. A subcontractor may utilize this dumpster for its debris. Boxes are to be broken down prior to disposal.
 - Subcontractor must maintain a neat and orderly job site always. Daily clean-up is required
 - Subcontractor to protect surrounding areas from airborne dust/debris, etc. while working.
- Subcontractor agrees to expeditiously perform its obligations and fully staff the project always. The subcontractor acknowledges receipt of the construction schedule and agrees that it may be modified from time to time with forty-eight (48) hours' notice. The subcontractor agrees that by commencing work, it has accepted the site and the work of any prior subcontractors, suppliers, or tradespeople and that the site is acceptable for its performance.

ARTICLE 9 – APPLICABLE LAW, LIMITATION OF ACTIONS, VENUE

- This Subcontractor Agreement is made and delivered in the State of Michigan and shall be construed in accordance with the laws of the State of Michigan.
- Any claims by Subcontractor against Laux related to this Subcontractor Agreement and/or the project must be brought within one (1) year from the date of last performance by Subcontractor.
- Any action arising out of or in any way related to this Subcontractor Agreement and/or the project shall be brought in a court of the State of Michigan located in the county of Ingham. Non-prevailing party shall pay all costs, including actual, reasonable attorney fees, court costs, actual expert and consultant costs and fees, and other expenses incurred by Laux to enforce and/or defend its rights under any part of this Subcontractor Agreement.

ARTICLE 10 – INSURANCE

- The Subcontractor shall provide general comprehensive liability insurance, public liability and property damage insurance, and worker's compensation coverage on all its employees or its subcontractors' employees engaged in the performance of this Subcontractor Agreement. Proof of this insurance shall be provided to Laux before the work commences, as set forth below.

Commercial General Liability Insurance



\$1,000,000 Each Occurrence Limit (Bodily Injury and Property Damage)
\$2,000,000 General Aggregate per Project
\$2,000,000 Products & Completed Operations Aggregate
\$1,000,000 Personal and Advertising Injury Limit

Business or Commercial Automobile Liability Insurance
\$1,000,000 combined single limit per accident

Worker's Compensation and Employers' Liability Insurance
\$100,000 Each Accident
\$100,000 Each Employee for Injury by Disease
\$500,000 Aggregate for Injury by Disease

Excess or Umbrella Liability
\$1,000,000 occurrence/aggregate

- Laux and owner, along with their respective officers, agents, and employees, shall be named as additional insured for Ongoing Operations and Products/Completed Operations on the Subcontractor's and any Sub-Subcontractor's Commercial General Liability Policy, which must be primary and noncontributory with respect to the additional insureds.
- It is expressly understood by the parties to this Subcontract that it is the intent of the parties that any insurance obtained by Laux is deemed excess, non-contributory, and not co-primary in relation to the coverage(s) procured by the Subcontractor, the Sub-Subcontractor or any of their respective consultants, officers, agents, subcontractors, employees, or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of the aforementioned may be liable by operation of the statute, government regulation or other applicable law.

ARTICLE 11 – LABOR

- The Subcontractor shall employ at the worksite only such labor as shall avoid all union jurisdictional disputes and cause no delay in executing this Subcontractor Agreement. Laux Construction reserves the right to replace the Subcontractor's employees and employees of any sub-subcontractors if such employees are not acceptable to Laux or the owner.

ARTICLE 12 – TAXES

- The Subcontractor shall pay for themselves and its sub-subcontractors if any, all unemployment compensation, old age, or other social security taxes and income taxes and withholding taxes due in relation to work done under this Subcontractor Agreement and agrees to defend, indemnify, and hold harmless the owner and Laux for any such taxes.

ARTICLE 13 – MATERIALS

- The Subcontractor agrees that Laux shall not be liable for any material, either raw or processed, provided by the Subcontractor more than this Subcontractor Agreement.

ARTICLE 14 – SAFETY

- The Subcontractor shall take all safety precautions required by code, regulation, statute, or law with respect to the performance of the work required for the project and this Subcontractor Agreement. The Subcontractor shall comply with safety measures initiated by Laux and with applicable laws, ordinances, rules, regulations, and orders of public



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authorities for the safety of persons and property. The Subcontractor shall report to Laux within twenty-four (24) hours any injury to person or property which occurred at the site.

- Hard hats must be worn by all workers and visitors on site always. Anyone on-site without a hard hat will be required to leave the site.
- Work boots, shirts, and long pants are required to be worn by all workers on site always. Any worker on-site without any one of these items will be removed from the job site.
- Material Safety Data Sheets must be submitted by the Subcontractor to Laux for any chemical-based products (i.e., adhesives, paints, etc.) prior to the start of any work using such products. Each worker to provide all necessary personal safety equipment as required by MIOSHA.

ARTICLE 15 – CLEAN-UP

- The Subcontractor shall maintain the Project premises in a clean and orderly manner always. If the Subcontractor fails to do so, Laux may clean up and charge the Subcontractor for the Subcontractor's share of clean-up costs.

ARTICLE 16 – TERMINATION

- Laux may cancel this Subcontractor Agreement without any liability to Subcontractor if Subcontractor does not perform as specified herein. Any additions or deletions by the Subcontractor to the conditions set forth herein must be accepted in writing by Laux. Laux may cancel and/or terminate this Subcontractor Agreement without any liability to the Subcontractor if the owner cancels and/or terminates the Contract with Laux. Laux additionally reserves the right to terminate this Subcontractor Agreement if the Subcontractor:
 - a. fails to provide submittals, labor, materials, or equipment as required by this Subcontract Agreement and in accordance with the project Bid Documents.
 - b. fails to furnish Laux with assurances satisfactory to Laux that evidence the Subcontractor's ability to complete the work in compliance with all the requirements of this Subcontractor Agreement.
 - c. fails to pay its debts as they come due, including but not limited to failing to make payments to sub-subcontractors/suppliers for materials or labor in accordance with the respective agreements between the Subcontractor and sub-subcontractors/suppliers.
 - d. persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials for the project.
 - e. permits construction and/or bond liens to be filed by the said subcontractor and or any of their vendors or subcontractors regarding the project.
 - f. fails to correct any defective work within a reasonable time.
 - g. fails to honor any warranty supplied by the Subcontractor within a reasonable time.
 - h. voluntarily or involuntarily files for any bankruptcy protection.
 - i. incur judgments against it; or
 - j. permits any third-party garnishment to be issued against Laux.
 - k. if any of the terms and conditions are edited in any way this Subcontractor Agreement will become null and void.



ARTICLE 17 – DEFAULT

- If the Subcontractor fails to carry out the work in accordance with this Subcontractor Agreement or otherwise fails to comply with the terms and conditions of this Subcontractor Agreement, Laux will issue a written notice of default. If within twenty-four (24) hours after issuance of written notice from Laux Construction, the Subcontractor fails to commence and continue correction of such default, Laux may, at its option, terminate the Subcontractor Agreement and correct such deficiencies and deduct the actual cost thereof from the payments then or thereafter due to the Subcontractor, if any. However, in the case of the events listed in Article 16(g), through (i), the termination will be automatic and immediate. The remedies set forth in this Subcontractor Agreement for Laux are cumulative to Laux's other rights and remedies at law, in equity, or otherwise and are not intended to be exclusive.

ARTICLE 18 – ARBITRATION

- In the event Laux is obligated to arbitrate claims with the owner, the Subcontractor agrees to arbitrate all claims that arise out of the same transaction or occurrence as claims in the same arbitration. Any arbitration award will be enforceable in any court of competent jurisdiction.

ARTICLE 19 – INDEMNIFICATION

- To the fullest extent permitted by law, the Subcontractor shall defend, indemnify, and hold harmless Laux and its agents, employees, officers, owners, successors, and assigns from and against any and all liabilities, claims, causes of action or lawsuits arising out of or in any way related to or caused by (i) Subcontractor's default or breach of this Subcontractor Agreement or failure to perform the terms and conditions of this Subcontractor Agreement; (ii) third party claims or claimed extras of a sub-subcontractor/supplier of Subcontractor (iii) Subcontractor's violation of safety requirements (iv) personal injury or death to any person, including employees of the Subcontractor, its agents or invitees, or property damage (including the work itself), including claims for loss of use (v) the operations or acts of commission or omission of the Subcontractor, including those of its employees, agents or officers, of its sub-subcontractors, or sub-subcontractors' employees, agents, or officers, unless the injuries are caused by the sole negligence of a party indemnified hereunder, and/or (v) any other claims which arise out of or result from, or are in any way connected with Subcontractor's work covered by this Subcontractor Agreement.
- The Subcontractor's indemnification obligation shall include indemnity for all damages, interests, costs, fees, expert witness fees, expenses, and reasonable attorney fees, including prosecuting or defending a claim or incurred in securing the indemnity from the Subcontractor if it refuses to defend or pay any of the indemnity obligations above.
- The Subcontractor's obligation to indemnify shall not include any obligation to indemnify which is prohibited by MCLA 691.991 or other comparable state law.

ARTICLE 20 – ELECTRONIC OR DIGITAL COMMUNICATION

- Laux may rely upon any electronic and/or digital communication.

ARTICLE 21 – SUBCONTRACTOR'S ABILITY TO COMPLETE THE PROJECT

- The Subcontractor, by executing this Subcontractor Agreement, provides assurances to Laux, upon which Laux relies, that Subcontractor can complete the project in a timely manner, is financially capable of completing the project, and is intimately familiar with the project and all Bid Documents.



ARTICLE 22 – CLOSE-OUT DOCUMENTS

- Subcontractor will forward all appropriate close-out documents required per project Bid Documents or as requested by Laux project manager. Close-out documents must be submitted in the format requested by the project manager (ie, hard copies, etc.). If these documents are not received by the deadline date established by Laux, **Laux will deduct \$100.00 per day from the final invoice.** Should Laux be required to print hard copies of close-out documents, the Subcontractor will be billed at a rate of \$1.00 per page.

ARTICLE 23 – TERMS AND CONDITIONS INCLUDED IN SUBCONTRACTS

- The Subcontractor shall include the terms and conditions of this Subcontractor Agreement in all its subcontracts with third parties related to this project.

It is understood that in accepting this offer, you (the Subcontractor) agree to the terms and conditions set forth in this Subcontractor Agreement.

Job Name:
Laux Job #:

Subcontractor:	_____	Contractor:	Laux Construction
Signature:	_____	Signature:	_____
By:	_____	By:	David Laux
Title:	_____	Title:	CEO/President
Date Signed:	_____	Date Signed:	_____



PURCHASE ORDER AGREEMENT

Contract Date:

Job No: 24019

Supplier:

Project Name: Newcomer Center Remodeling

PURCHASE ORDER SPECIFICATIONS:

Above Supplier agrees to provide all materials/equipment necessary to complete the above-listed Project according to all bidding documents (Bid Documents), including:

Supplier to provide materials/equipment per the following sections of the specifications in the Bid Documents:

- Following documents must be submitted with all monthly Pay Applications:
 - Conditional Lien Waivers for current pay application.
 - Any evidence required by the owner and/or any applicable provisions of any other construction lien law, bond law, or similar applicable law.
 - Final retainage billings must be submitted on a separate payment application.

If any of the above items are not submitted with the Supplier's Pay Applications, the Pay App will be rejected.

- Final invoicing/pay applications must be submitted to Laux Construction within 30 days after supplier work is complete. Any invoices/pay applications submitted by supplier after 90 days will be null and void.

All communication/correspondence from Suppliers must be directed to Laux. Suppliers are not to contact the owner/architect directly for any reason.

Laux Project Manager / Emergency Contact (RFI's, submittals, etc.):
Chais VanDeventer

Laux Project Controller (Pay Applications, Contracts, Certified Payroll, General Billing Questions):
Kitty Gailey

Laux Site Superintendent (scheduling, site issues, site access, etc.):
TBD

CONTRACT PRICE: 00/100

\$0.00



TERMS AND CONDITIONS

BY ACCEPTING THIS PURCHASE ORDER, THE SUPPLIER AGREES:

- That it has read, understands, and is able to timely provide the materials/equipment as required by the Bid Documents.
- Submittals
 - Submittals to be forwarded to Laux via e-mail in PDF format
 - (3) sets of samples to be forwarded to Laux (if applicable)
- To assume all risk of damage or injury to property or persons, however, caused, related in any way to the materials/equipment provided by Supplier or any action or operation related to this Purchase Order Agreement and to defend, hold harmless, and indemnify the owner and Laux from and against all claims and suits on account of such damage or injury.
- To provide workmen's compensation, public liability, and property damage insurance coverage on all its employees, agents, Suppliers, and Suppliers engaged in executing this order.
- To employ at the project site only such labor or drivers as shall avoid all union jurisdictional disputes and cause no delay in executing this order.
- To pay for itself and its Suppliers, if any, all unemployment compensation, old age, or other social security taxes due related to materials/equipment supplied pursuant to this Purchase Order Agreement and agrees to defend, indemnify, and hold harmless the owner and Laux from and against all claims and suits for any such taxes.
- That Laux shall not be liable for any materials/equipment, either raw or processed, in excess of this order.
- To defend, indemnify, and hold harmless Laux from and against any and all claims and/or actions related to defects in materials/equipment provided by the Supplier.
- That this Purchase Order Agreement embodies the entire agreement between Laux and the Supplier with respect to its subject matter, and there are no representations, promises, warranties, covenants, or undertakings other than those expressly set forth herein or therein. This agreement supersedes all prior agreements and understandings between the parties hereto with respect to its subject matter. This agreement may be amended only by a written instrument duly executed by the parties hereto.
- To defend, indemnify, and hold harmless, the owner, Laux, its employees, agents, independent contractors, and assigns against any and all suits for claimed infringements of letters patent claimed to cover Supplier's products, or any part thereof.
- That Laux may cancel this order if not executed as specified in the Bid Documents and that, at Laux's option, this contract shall be null and void if the Supplier makes any additions or deletions to the conditions set forth herein.
- That this order is subject to unilateral modification by Laux in the event of a fire, accidents, strikes, government acts, or other conditions beyond its control.
- That the Supplier shall not assign the performance of its obligations under this Purchase Order Agreement without the prior written consent of Laux. Any attempt at such an assignment without Laux's prior written consent shall be void.
- That the Supplier shall furnish all sworn statements or other documents, or evidence required by any applicable provisions of any mechanic's lien law, bond law, or similar applicable statute.
- That it is bound to Laux by the terms of this Purchase Order Agreement, including the Bid Documents, and all General Conditions and/or Special Conditions, except as modified herein, and to assume toward Laux, except as specially stipulated to the contrary, all obligations and responsibilities that Laux, by said documents, assumes towards the owner of the project.
- That this Purchase Order Agreement is made and delivered in Michigan and shall be construed in accordance with the laws of said state.
- That any action arising out of or in any way related to this Purchase Order Agreement shall be brought in a court of the State of Michigan located in the county of Ingham.
- That it shall pay all costs, including actual, reasonable attorney fees incurred by Laux, should it be necessary to enforce any part of this Purchase Order Agreement
- Invoices for a monthly draw to be in our office no later than the 15th day of the month unless prior contractual agreement applies with the Supplier.
- That payment from the owner of the Project to Laux for materials/equipment provided by the Supplier is a condition precedent to Laux's obligation to pay the Supplier for the materials/equipment. Laux shall have no liability to the Supplier if Laux does not receive payment from the owner of the Project for materials/equipment provided by the Supplier.
- Laux will not pay for extra work, materials, or equipment provided by the Supplier unless Supplier obtains a written change order signed by Laux prior to said extra work, materials, or equipment being provided.
- In no event shall Laux be liable for any incidental or consequential damages.
- In no event shall Laux be liable for any amount as damages for a breach of this Purchase Order Agreement in excess of the Contract Price stated herein.
- Acceptance of the offer contained in this Purchase Order Agreement is expressly limited to the terms set forth herein.
- Project Information: It is agreed that the Supplier will provide all project information requested by Laux, owner, architect, or engineer such as, but not limited to, shop drawings, color samples, product submittals.
- Supplier Generated Material Take-Off: It is agreed that if Supplier provides Laux with a material estimate take-off done by Supplier's staff from Bid Documents provided, that Supplier will provide said materials at a "Guaranteed package price" and will not hold Laux or its employees, agents, or independent contractors, liable for quantity of materials used and will supply sufficient quantities to complete the project as drawn and specified. It is the responsibility of the Supplier to maintain a continuous log of materials used. If the Supplier feels materials are being misused or over-used, Supplier will inquire in writing to contractor.
- Laux Construction Generated Material Take-Off: It is agreed that if Laux provides the materials estimate take-off, that Supplier will provide only the quantity of materials in Laux's estimate. It is also understood that if quantities vary from the Material Take-Off amount the pricing of added or returned materials will remain the same for the duration of the project.
- Any discrepancies, errors, conflicts, omissions, etc. in the Bid Documents provided by the designer/architect/engineer affecting the scope of this agreement have been brought to the attention of the Contractor prior to the original bid date of the project and have been properly addressed by all parties.
- Should there be any conflicts between blueprints and specifications, the higher standard shall take precedence.
- If any of the terms and conditions are edited in any way this Purchase Order Agreement will become null and void.



517-694-0117
517-694-0359
info@lauxconstruction.com
www.lauxconstruction.com

ACCEPTANCE OF PURCHASE ORDER: By signing below, I acknowledge that 1) I am authorized to sign on behalf of and bind Supplier, 2) Supplier accepts this Purchase Order Agreement, 3) Supplier has read and agrees to all terms and conditions set forth in this Purchase Order Agreement.

Job Name: _____

Laux Job #: _____

Supplier: _____

Contractor: Laux Construction

Signature: _____

Signature: _____

By: _____

By: David Laux

Title: _____

Title: CEO/President

Date Signed: _____

Date Signed: _____

DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Sin ing nd rogram, in accordance with the wner a ro ed lans and specifications, all applicable laws, the Owner's fixed budget, and as otherwise approved the wner.

THE OWNER:

(Name, legal status and address)

Lansing School District
est Kalamazoo Street
Lansing, Michigan
ele hone N m er

THE ARCHITECT:

Name, legal status and address

ergmann Associates
th Street N
Site
rand Ra ids, Michigan
ele hone N m er

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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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor hereinafter the Agreement and consist of the Agreement, Conditions of the Contract General, Supplemental and other Conditions, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is a written amendment to the Contract signed by both parties, a Change Order, a Construction Change Directive, or a written order or a minor change in the work issued by the Architect. Unless specifically enumerated in the Agreement in writing, the Contract Documents also include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished to the Owner in anticipation of receiving bids or proposals, accepted portions of the Contractor's bid or proposal, and portions of Addenda relating to bidding or proposal requirements. The Contractor's execution of the Owner/Contractor Agreement and the Architect's execution of the Owner/Architect Agreement shall constitute their respective acceptance of all provisions of the Drawings, Addenda, and all Contract Documents as of the revision applicable to the date of such signature.

§ 1.1.2 The Contract

The Contract Documents form the Contract or Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship or an indebtedness between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate the Contractor's performance of its duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the project.

§ 1.1.4 The Project

The project is the total construction of which the work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium or session now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, sketches, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions or interpretations, as applicable, on Claims in accordance with Section . . .

§ 1.1.9 The term "Product(s)" as used in the Contract Documents refers to the materials, systems and equipment provided by the Contractor or used in the work of the project.

§ 1.1.10 The terms “Warranty” and “Guarantee” as used in the Contract Documents shall have the same meaning and shall be defined as “legally enforceable assurance of satisfactory performance or quality of a product or Work,” in all events subject to the terms and applications of the Contract Documents.

§ 1.1.11 These materials, systems and equipment items are referred to in the singular, such reference shall not serve to limit the antitrust. The Contractor shall furnish quantities as required by the Contract Documents to complete the Work.

§ 1.1.12 Unless specifically limited in the Contract, the words “furnish,” “install,” and “provide,” or any combination thereof, mean to furnish and incorporate into the Work, including all necessary labor, materials, and equipment and other items required to perform the Work indicated.

§ 1.1.13 The Project Manual is a volume assembled or the Work which may include the bidding requirements, same forms, Conditions of the Contract and Specifications.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required in one shall be as binding as is required in all other portions. The Contractor shall be required only to the extent consistent with the Contract Documents and reasonable in the event of any conflict. The Contractor shall be required to provide the indicated results. In the Drawings and Specifications conflict with each other regarding the quality or quantity of Work or required, the latter shall prevail, and shall be required, unless instructions are otherwise furnished to the Contractor by the Architect in writing with the Owner's consent.

§ 1.2.1.1 The invalidity of an provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that an provision of the Contract Documents violates an law, or is otherwise in violation of public policy, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by a trade. Where responsibility for an article or is required of the Contractor, the Contractor shall not be released from that responsibility because of the location of the Specification, Drawing, or other information that establishes the responsibility. However, or example, the Contractor shall be responsible for all Work required of it, even though that responsibility may be shown only in that portion of the Contract Documents typically pertaining to another contractor or trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply.

- Where requirements specifically set forth in the Agreement are in conflict with other Contract Documents, including, but not limited to, these General Conditions, the Agreement shall govern.
- In all other instances, the conflict shall be resolved by complying with the provision that is most favorable to the Owner, as determined in the Owner's sole discretion.
- When a duplicate of material or equipment occurs in the Drawings, the Specifications or other Contract Documents, each Contractor shall be deemed to have bid on the basis of each furnishing such material or equipment. The Owner will decide which Contractor shall furnish the same.

§ 1.2.4.1 Notwithstanding anything to the contrary in Section 1.2.4, if there should be a conflict or ambiguity within a single Contract Document or example, these General Conditions, as modified, the conflict or ambiguity shall be resolved by complying with the provision that is most favorable to the Owner, as determined in the Owner's sole discretion.

§ 1.2.5 It is the intent of the Contract Documents to accomplish a complete and workmanlike installation in which there shall be installed new products of the latest and best design and manufacture, and workmanship shall be thorough first class, executed competently and by experienced workmen.

Details of preparation, construction, installation, and finishing encompassed by the Contract Documents shall conform to the industry standards of the respective trades, and that workmanship and construction methods shall be of workmanlike quality so as to accomplish a neat and finished job, consistent with industry standards.

Where specific recognized standards are mentioned in the Specifications, it shall be interpreted that such requirements shall be complied with.

§ 1.2.6 The Contractor acknowledges that there may be items of the Work that the Contractor is responsible to provide under the Contract Documents that are not drawn or specified in the design that are necessary for the proper execution and completion of the Work, and are consistent with, and reasonable in a reasonable manner, the Drawings and Specifications. Provided the necessary work or materials does not materially increase the cost of the Work, all such items shall be provided as part of the Work without delay in its progress and without an increase in the Contract Sum.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are specifically defined, the titles of numbered articles, or the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and unless otherwise indicated in the Contract Documents or the Owner/Architect Agreement, the Architect and the respective consultants will retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Suppliers, and Sellers shall not own or claim a copyright in the Instruments of Service. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Suppliers, and Sellers are authorized to use and reproduce the Instruments of Service, subject to any protocols established pursuant to Section 1.5.1, solely and exclusively for the execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Suppliers, and Sellers may not use the Instruments of Service on other projects or for additions to the project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.5.3 The Drawings, Specifications, and other documents and all data used in compiling analyses, reports, or inspections at the project Site and the results therefrom, as well as all photographs, drawings, specifications, schedules, data processing output, computer-aided design/drawing (CADD) system data files, computations, studies, audits, reports, models and other items of liability, and all intellectual property, prepared or created or in connection with the project and retained by the Owner, the Contractor, or a third party, belong to the Owner. The Contractor may retain one record set. All copies of them, except Contractor's record set, shall be returned or suitably accounted for on completion of the Work. They are to be used solely with respect to the project. The Contractor shall not, without the prior written consent of the Owner, use or permit anyone to use any Drawings, Specifications, or other documents prepared or in connection with the project, or any concepts or ideas developed in connection with the project, or any purpose other than the project. The Owner shall at all times have access to and control over the disposition of any Drawings, Specifications, and other documents pertaining to the project.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section . . . , where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to an appropriate representative of the party to whom the notice is addressed and shall be deemed to have been delivered in person, registered or certified mail, courier, or electronic transmission if an acknowledgment of receipt is received from the recipient or proof of receipt is otherwise established. The parties acknowledge that an appropriate representative of the Owner shall have authority only to the extent provided by the Owner's Board of Education.

§ 1.6.2 Notice of Claims as provided in Section . . . shall be provided in writing and shall be deemed to have been delivered only if delivered to an appropriate representative of the party to whom the notice is addressed certified or registered mail, or courier providing proof of delivery. The parties acknowledge that an appropriate representative of the Owner shall have authority only to the extent provided by the Owner's Board of Education.

§ 1.7 Digital Data Use and Transmission

The parties may agree on protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to matters requiring the Owner's approval or authorization subject to parameters of authority established by the Owner's Board of Education as provided in writing to Contractor.

Benjamin Shalidiner or his designee shall serve as initial Owner representatives and shall be reasonably available to Contractor. Except as otherwise provided in Section . . . , the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 NOT USED.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and on written request the Contractor, the Owner shall furnish, as applicable, to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section . . . , the Contract time shall be extended a pro rata amount agreed in writing between the Owner and Contractor.

§ 2.2.2 Following commencement of the Work and on written request the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make a payment when due or a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall immediately notify the Owner that the Work has stopped and state with specificity when evidence provided or not provided the Owner is insufficient. However, if the request is made because a change in the Work materially changes the Contract Sum under a portion of the Work, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section . . . , the Contract time shall be extended a pro rata amount and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents. The parties' disagreement as to the appropriateness of payment for services performed shall not constitute the Owner's failure to make financial arrangements to fulfill the Owner's obligations under the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section . . . , the Owner shall not materially alter such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Information is protected law and/or the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any

other person. However, the Contractor may disclose such "confidential" information, after seven (7) days' notice to the owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or court or arbitrator's order. To the extent permitted by law, the Contractor may also disclose such "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Subcontractors, and others who need to know the content of such information solely and exclusively for the project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except where permitted and fees that are the responsibility of the Contractor under the Contract Documents, including, but not limited to, those required under Section 2.3.1, the owner shall secure and allow or necessary easements, easements, assessments and charges required for construction, use or occupancy of permanent structural or permanent changes in existing facilities.

§ 2.3.2 The owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the State of Michigan. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The owner shall furnish a description of physical characteristics, legal limitations and utility locations of the site of the project, and a legal description of the site. Taking into account the Contractor's experience and expertise, and exercise of professional caution, the Contractor shall be entitled to rely on the accuracy of information furnished by the owner. The owner shall exercise proper precautions relating to the safety or performance of the work. The Contractor shall not be entitled to additional compensation resulting from its failure to confirm the location of site utilities or existing structures prior to the opening of the Contractor's bid.

§ 2.3.5 Upon specific written request to the Contractor, the owner shall furnish information or services required of the owner by the Contract Documents with reasonable promptness. The owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services. Contracts with other Contractors alone shall not constitute sufficient owner control or releases of this Section.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the owner shall furnish to the Contractor one copy of the Contract Documents or releases of obligations pursuant to Section 2.3.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct work that is not in accordance with the requirements of the Contract Documents as required by Section 2.4 or fails to carry out work in accordance with the Contract Documents, the owner may issue a written order to the Contractor to stop the work, or an portion thereof, until the cause of such order has been eliminated. However, the right of the owner to stop the work shall not give rise to a default on the part of the owner to exercise this right or the ability of the Contractor or another person or entity, except to the extent required by Section 2.4. This right shall be in addition to and not in limitation of the Owner's rights under any provision of the Contract Documents.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the work in accordance with the Contract Documents and fails within a three business day period after receipt of notice from the owner or the Owner's designee including, or this release, the Architect to commence and continue correction of such default or neglect with diligence and promptness, the owner may, without recourse to other remedies the owner may have, including an claim against the Contractor's performance bond, correct such default or neglect. In the event the Contractor's default or neglect results in a threat to the safety of persons or property, the Contractor shall immediately commence and continue correction otherwise, the owner may undertake the same actions as permitted in the prior sentence. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses, including an and all legal expenses incurred to effectuate and enforce this provision, and compensation for the Architect's and/or other Contractor's additional services made necessary by such default, neglect, or failure. If the Contractor does not agree to a Change

order as described in the preceding sentence, the owner may nevertheless withhold the reasonable cost of correcting such deficiencies and the expenses identified in the preceding sentence including, but not limited to, all legal expenses incurred to effectuate and enforce this provision. Exercise of such rights shall in no way limit or jeopardize the Owner's right to any claim against the performance bond or Contractor. The Architect may also, pursuant to Section 1.10, withhold or nullify a Certificate or a payment in whole or in part, to the extent reasonable necessary to reimburse the owner for the reasonable cost of correcting such deficiencies, including the aforementioned Owner's expenses and compensation for the Architect's additional services made necessary by such delay, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall make the difference to the owner. If the Contractor disagrees with the actions of the owner or the Architect, or the amounts claimed as costs to the owner, the Contractor may file a Claim pursuant to Article 10. In the event the owner directs another entity to perform or pursuant to this Section that otherwise is the obligation of the Contractor, including correction of safety violations, either at the Contractor's request or as a result of the Contractor's failure to perform such Work, the owner may withhold any payments due Contractor to cover all costs of labor, material, and equipment less that other entity's administrative, profit, and overhead costs. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall make the difference to the owner.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the work in accordance with the Contract Documents either activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.1.4 These General Conditions refer to the relationship between the owner and Contractor. As to the contract between the Contractor and its Subcontractors, the General Conditions shall be read as the Contractor having the position of the owner and the Subcontractors having the position of the Contractor. The Subcontractors are bound to the Contractor just as the Contractor is bound to the owner. The Subcontractor shall have all the rights, duties and obligations to the Contractor as the Contractor has rights, duties and obligations to the owner. The Subcontractors shall agree to and accept the same responsibility to the owner as the Contractor. In the event an architect or a Subcontractor or the Subcontractor's Subcontractor or supplier, at any tier, causes any type of defective Work, injury, loss or damage to the owner, direct or indirect, the Contractor shall be jointly and severally liable to the owner or such injury in addition to any responsibility or liability of the Subcontractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract requires the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the work is to be performed, and correlated personal observations with requirements of the Contract Documents. The Contractor shall independently verify all information related to utilities prior to beginning the work. The Contractor shall make careful investigation to establish the exact location of any such items indicated on the Drawings e.g., locate via hand digging before excavating. The Contractor shall be responsible for all costs arising out of damage to such items or additional construction costs incurred because Contractor failed to verify said information.

§ 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 1.10, shall take field measurements of any existing conditions related to that portion of the work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction of the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents. However, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered or made known to the

Contractor as a request or information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or law orders of local authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered or made known to the Contractor as a request or information in such form as the Architect may require, with a copy of the same to be forwarded to the Owner.

§ 3.2.4 If the Contractor alleges that additional cost or time is incurred because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 17. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, or differences between field measurements or conditions and the Contract Documents, or nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and law orders of local authorities.

§ 3.2.5 Prior to submitting its bid, the Contractor shall have studied and compared the Contract Documents and shall have reported to the Architect any error, inconsistency or omission in the Contract Documents. It will be presumed that the Contractor's bid and the Contract Sum include the cost of correcting any such error, inconsistency or omission, which could have been discovered through the exercise of reasonable diligence. Unless the Contractor establishes that such error, inconsistency or omission could not have been discovered through the exercise of reasonable diligence, the Contractor will make such corrections without additional compensation so that the Work is functional.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall elaborate the on-site setting thereof and shall be solely responsible for the on-site setting of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall elaborate the proposed alternative solely for conformance with the design intent of the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. The Contractor shall immediately notify the Architect and Owner of delays or other Contractors that could impact timely coordination and completion of the Work.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, subcontractors and their agents and employees, and other persons or entities performing portions of the Work, or on behalf of, the Contractor or any of its subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work. The Contractor shall be deemed to have accepted prior Work when it commences provision of subsequent Work and shall be responsible for the cost of repair, replacement, or reconstruction if the prior Work is found to be improper.

§ 3.4 Labor and Materials and Utilities

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and maintain all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for performance and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Such provision of labor and materials shall occur

in sufficient time to satisfy the existing project schedule. The Contractor bears the risk of an inability to timely provide schedule and materials for any reason. The Contractor agrees to execute the appropriate CC forms to effectuate the Owner's ownership of the material and equipment furnished pursuant to this Agreement.

§ 3.4.2 Except in the case of minor changes in the work approved by the Architect in accordance with Section 3.4.1 or ordered by the Architect in accordance with Section 3.4.2, the Contractor may make substitutions only with the consent of the Owner, a written approval by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the work. The Contractor shall not permit employment of non-employees or persons not properly licensed in tasks assigned to them.

§ 3.4.4 The Contractor agrees that neither it nor its Subcontractors will discriminate against an employee or applicant for employment, to be employed in the performance of this Contract, with respect to hire, tenure conditions or privilege of employment, or any matter directly or indirectly related to employment, because of race, age, sex, color, religion, national origin, ancestry or physical disability. No person shall be regarded as a material breach of this Contract.

§ 3.4.5 Immediately after "award of the Contract," the Contractor shall provide the Architect a list showing the name of the manufacturer proposed to be used for each of the products identified in the Specifications and, where applicable, the name of the installing Subcontractor.

§ 3.4.6 The Architect will rely in writing to the Contractor stating whether the Owner or the Architect, a third party investigation, has reasonable objection to an installation. Adequate data on an approved manufacturer or installer is not available, the Architect may state that action will be deferred until the Contractor provides further data.

§ 3.4.7 In all cases involving utilities, unless the Contract Documents specifically provide otherwise, it shall be the Contractor's responsibility to coordinate the Work with the owners of such utilities for the protection of such utilities and the safety associated with working with or in the vicinity of such utilities. The Contractor shall coordinate any required private and/or public utility companies to provide utilities to the work and/or shall coordinate relocation of utilities as required by the work. An reference to the Owner being responsible for the coordination of, the design of, or the relocation of any utility or associated equipment, which it does not own or control, requires only reasonable efforts by the Owner to coordinate such activity.

§ 3.4.8 Asbestos-Free Product Installation

§ 3.4.8.1 It is hereby understood and agreed that no product and/or material containing asbestos, including chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any combination of these materials that have been chemically treated and/or altered shall be installed or introduced into the work or the Contractor or its employees, agents, Subcontractors, or other individuals or entities over whom the Contractor has control. The Contractor shall be required to provide a signed certification statement ensuring that all products or materials installed or introduced into the work will be asbestos free.

§ 3.4.8.2 The Contractor also shall be required to furnish certified statements from the manufacturers of supplied materials used during construction verifying their products to be asbestos free in accordance with the requirements of Section 3.4.8.1.

§ 3.4.8.3 The Contractor shall complete and submit to the Owner a certification identifying asbestos free product installation prior to issuance of the final Certificate of Acceptance in a form acceptable to the Owner.

§ 3.4.9 Asbestos may be present within the construction areas. Contractors are to become aware of Owner's hazardous material reports prior to construction. Contractors are not to disturb any in-place hazardous materials. The Contractor must immediately stop work and notify the Owner if it reasonably suspects the presence of unknown hazardous materials and/or has disturbed any materials reasonably suspected to be hazardous materials.

§ 3.5 Warranty

§ 3.5.1 In addition to any other warranties, guarantees, or obligations set forth in the Contract Documents or applicable as a matter of law, and not in limitation of the terms of the Contract Documents, the Contractor warrants and guarantees that

- .1 The Owner will have good title to the Work and all materials and equipment incorporated into the Work and, unless otherwise expressly provided in the Contract Documents, will be new.
- .2 The Work and all materials and equipment incorporated into the Work will be free from all defects, including any defects in workmanship or materials.
- .3 The Work and all equipment incorporated into the Work will be fit for the purposes for which they are intended.
- .4 The Work and all materials and equipment incorporated into the Work will be merchantable.
- .5 The Work and all materials and equipment incorporated into the Work will conform in all respects to the Contract Documents in the reasonable judgment of Architect.

On notice of the breach of any of the foregoing warranties or guarantees or any other warranties or guarantees under the Contract Documents, the Contractor, in addition to any other requirements in the Contract Documents, will commence to correct such breach within the hours after written notice thereof and thereafter will use its commercially reasonable best efforts to correct such breach to the satisfaction of the Owner provided that if such notice is given a terminal allowance hereunder, such hour period shall be extended to seven days. The foregoing warranties and obligations of the Contractor shall survive the final payment and/or termination of the Contract.

The Contractor shall, at the time of final completion of the Work and as a condition precedent to final payment to the Contractor, assign to the Owner all manufacturers' warranties related to the materials and labor used in the Work. The Contractor further agrees to perform the Work in such manner as to reserve and assign all such manufacturers' warranties and deliver to the Architect the warranties, project manuals, operating procedures, and other materials related to each of the building systems and materials included in the Contractor's Work and as required by the Specifications.

Notwithstanding anything contrary in the foregoing or in any other Contract Documents, labor shall be warranted for one year, commencing as of the date specified in the Architect's Certificate of Substantial Completion, and the manufacturer warranties applicable to the materials integrated into the Work shall commence and end as provided in the such warranty documents, provided to Owner in accordance with this Section . . .

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferred to the Owner, and shall commence in accordance with Section . . .

§ 3.6 Taxes

The Contractor shall pay all sales, consumer, use and similar taxes on the Work provided the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not effective or merely scheduled to go into effect. The Contractor shall pay all local, state and federal taxes levied on its business, income or property and shall make all contributions for social security and other wage or payroll taxes. The Contractor shall be solely responsible for such payments and shall indemnify the Owner and hold it harmless therefrom.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 The Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections of government agencies necessary for erection and completion of the Work that are contractually required under the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and law orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor is or contravenes applicable laws, statutes, ordinances, codes, rules and regulations, or law orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or known physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide written and dated notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observation of the conditions. The Architect will promptly investigate such conditions and, if the Owner and Architect determine that the difference materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the work, the Architect will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Owner and Architect determine that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Contractor in writing, stating the reasons. If the Contractor disputes the determination or recommendation, the Contractor shall submit a Claim as provided in Article 17. The requirements of Section 17.4 A, as amended, are hereby incorporated into this document. The Contractor shall be alert to an indication or evidence of existing underground or concealed utilities or structures not shown on the Contract Documents and shall immediately notify the Owner or discontinue such evidence. If the Contractor encounters such utilities or structures, it shall cease operations immediately to minimize damage and shall notify the Owner and Architect. The Contractor shall bear the cost of damage resulting from its failure to exercise reasonable care in its construction activities or from continuing operations without notifying the Owner.

§ 3.7.4.1 The Contractor, in addition to the work, is responsible for visiting the site and determining all local conditions that may affect its work.

§ 3.7.5 If, in the course of the work, the Contractor encounters human remains or recognizes the existence of cultural markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend operations that would affect them and shall provide written and dated notification to the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed. The Contractor shall continue with all other operations that do not affect those remains or cultural resources. Rests or adjustments in the Contract Sum and Contract Time arising from the existence of such remains or cultural resources shall be made, as needed, as provided in Article 17.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied or such amounts and such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

1. allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all related taxes, less applicable trade discounts
2. Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated or stated allowance amounts shall be included in the Contract Sum but not in the allowances and
3. whenever costs differ from allowances, the Contract Sum may be adjusted according to Change Order. The amount of the Change Order shall reflect the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.1.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the project site during performance of the work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. The superintendent shall be satisfactory to the Owner in all respects, and the Owner shall have the right to require the Contractor to

remove an superintendent from the project whose performance is not satisfactory to the owner and to replace such superintendent with a superintendent who is satisfactory to the owner.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the owner and/or the Architect may notify the Contractor, stating whether the owner and/or the Architect has reasonable objection to the proposed superintendent or requires additional time for review.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, from time of award of the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the project. The schedule shall contain detail appropriate for the project, including the date of commencement of the project, interim schedule milestone dates, and the date of Substantial Completion. An annotation of the construction activity and the time required for completion of each portion of the project. The schedule shall provide for the orderly progression of the project to completion and shall not exceed time limits required under the Contract Documents or any scheduling dates issued by the Architect or owner. The schedule shall be revised at appropriate intervals as required by the conditions of the project and project. In no event shall the Contractor's Construction Schedule be extended due to action or inaction of the Contractor, except with prior written approval of the Owner within the Owner's sole, reasonable discretion.

The Contractor shall cooperate with the Architect and Owner in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other contractors or the construction or operations of the Owner's own forces. The Contractor acknowledges and understands that the work schedule will be modified from time to time with the Owner's approval to coordinate with the work of others and that such schedule changes do not give rise to a claim or damages or additional compensation to the Contractor or delay or otherwise. The Contractor shall be required to conform to the most recent owner approved schedule and acknowledges that such act was taken into account when it agreed to the Contract Sum and entered into this Contract.

§ 3.10.2 The Contractor, from time of award of the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Owner's and Architect's approval. The Owner's and the Architect's approvals shall not be unreasonably delayed or withheld. The submittal schedule shall be coordinated with the Contractor's construction schedule, allow for a reasonable amount of time to review submittals, and shall provide for editions and practical execution of the project. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to an increase in Contract Sum or extension of Contract time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall conform to the project in general accordance with the most recent approved project schedules and the most recent project schedule submitted to the owner and Architect consistent therewith.

§ 3.10.4 Progress Meetings Meetings of representatives of the various Contractors may be held for the purpose of coordination and furthering the progress of the project. Contractor and Subcontractor attendance is mandatory. Meetings shall be held at regular intervals as provided in the General Requirements special meetings may be held if deemed necessary by the owner and/or Architect.

§ 3.10.5 The Contractor shall proceed in accordance with the critical path set forth in the Construction Schedule. The Contractor shall monitor the progress of the project or performance with the requirements of the Construction Schedule and shall promptly advise the owner of any delay or potential delay. If an progress report indicates a delay, the Architect shall propose an alternative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall an progress report constitute an adjustment of the Contract time or a Milestone Date or the Contract Sum unless an such adjustment is agreed to by the owner and authorized representative to a Change Order.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar requirements. These shall be in electronic form or a hard copy, available to the Architect and Owner, and delivered to the Architect or submitted to the Owner on completion of the project or as a record of the project as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the project by the Contractor or a Subcontractor, Specialist Contractor, Manufacturer, Supplier, or Distributor or submitted to and reviewed by the Architect to illustrate some portion of the project.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor or submitted to and reviewed by the Architect to illustrate materials or equipment or some portion of the project. All shall be furnished and installed in accordance with the Drawings, Specifications, and as additionally required by the manufacturer's printed instructions. The Contractor shall review the manufacturer's instructions, and where conflict occurs between the Drawings or Specifications and the manufacturer's instructions, the Contractor shall request clarification from the Architect prior to commencing the project.

§ 3.12.3 Samples are physical examples or submitted to and reviewed by the Architect that illustrate materials, equipment, or workmanship, and establish standards which the project will be designed.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submissions are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents or those portions of the project for which the Contract Documents require submissions. Review by the Architect is subject to the limitations of Section 1.10. Informational submissions on which the Architect is not expected to take responsibility are so identified in the Contract Documents. Submissions that are not required by the Contract Documents may be returned to the Architect without action.

§ 3.12.5 The Contractor shall review or comply with the Contract Documents, approved, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submissions required by the Contract Documents, in accordance with the submission schedule approved by the Architect or, in the absence of an approved submission schedule, with reasonable promptness and in such sequence as to cause no delay in the project or in the activities of the Owner or of Separate Contractors.

Because the schedule does not allow for the resubmission of a Shop Drawing, Product Data, Sample or similar submissions, the Contractor agrees to ensure that its first submissions shall comply with all the requirements of the Contract Documents. It is further agreed that, for whatever reason, a Shop Drawing, Product Data, Sample, or similar submissions require more than one resubmission to secure the approval of the Architect, the Contractor may not be held liable for the amount of the actual delay damages charged or suffered by the Owner, but in an event not less than one day, plus the actual cost of the Architect's review(s) for each subsequent resubmission necessary to secure the aforementioned approvals. Without limiting the foregoing, the Contractor's obligation to hold the Owner harmless from and bear the costs of any delay, good faith refection or resubmission from a Shop Drawing, Product Data, Sample or similar submission to the Architect is conditioned on such delay or refection being attributable to an act or omission of Contractor.

§ 3.12.6 In submitting Shop Drawings, Product Data, Samples, and similar submissions, the Contractor represents to the Owner and Architect that the Contractor has reviewed and approved them, determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and checked and coordinated the information contained within such submissions with the requirements of the project and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the project for which the Contract Documents require submission and review of Shop Drawings, Product Data, Samples, or similar submissions, until the respective submission has been approved by the Architect.

§ 3.12.8 He or she shall be in accordance with a provision that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's review and approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect in detailed writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation as a minor change in the work, or a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, without the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents or a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities or construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications for a design professional related to systems, materials, or equipment are specifically required by the Contract Documents, the Owner and the Architect will specify performance and design criteria that such services must satisfy. Subject to its professional skill and expertise, the Contractor shall be entitled to rely on the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the work, designed or certified by such professional, including those prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely on the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10.1, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 Anything contained in the Contract Documents to the contrary notwithstanding, no one except the Owner shall be permitted to disrupt the operation of any building system or any other services without the Owner's prior written consent. Any request to perform such work shall be in writing, received by the Owner no less than five days prior to the commencement of the requested disruption, and shall detail the exact nature and duration of such interruption, the area affected, and any impact on the Construction Schedule caused by such proposed temporary disruption. Unless otherwise approved by the Owner, all work shall be performed during the hours and on the days set forth in the Specifications, in accordance with the most recent project schedule, and/or as directed by the Owner or Architect. The Contractor's failure to comply with the notice provisions of this section shall constitute a waiver by the Contractor of any right it may have to an adjustment of the Contract Time, on account of any postponement, rescheduling, or other delays ordered by the Owner in connection with an order for which appropriate notice was not furnished.

§ 3.13.3 The Contractor will consult with the Owner and the Architect concerning any necessary operations at the project site, including staging area limits, office or storage trailer locations, dumpster operations, equipment and material deliveries, hoisting areas and any other construction impacts on the Owner's grounds.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the work or all or partial completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or excavation. The Contractor shall not cut or otherwise alter construction of the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor and its Subcontractors, under the Contractor's direction, shall see that the premises and surrounding area are free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the project.

§ 3.15.2 If the Contractor fails to clean as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 Any areas and/or conditions occurring elsewhere on the project and adjacent areas leading to it, shall be maintained, opened to travel and kept in a clean condition. Failure by the Contractor to maintain said areas will result in the Owner's cleaning of same, at the expense of the Contractor.

§ 3.15.4 In addition to removal of rubbish, the Contractor and its Subcontractors, under the Contractor's direction, shall replace and re-energize, remove stains, spots, marks, and dirt from decorated work, clean hardware, and/or remove spots and smears from all surfaces which were affected by the work.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the work in preparation and progress where required.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall assume all royalties and license fees. The Contractor shall defend its or claims or infringement of copyrights and patent rights and shall indemnify and hold harmless the Owner and Architect from any and all cost, damages, or loss on account thereof, including, but not limited to, actual attorneys' fees, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturer is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, in an infringement of a copyright or patent is discovered, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect. The Contractor shall indemnify the Owner or Architect of any method of construction, invention, alliance, process, article, device or materials of any kind shall be or its adequacy in the work and shall not be an agent or the work thereof by the Contractor in violation of any patent or other rights of any third person.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property other than the work itself, but only to the extent caused by the

negligent acts or omissions of the Contractor, a Subcontractor, an employee or independent contractor, or an agent or subcontractor, or whose acts the contractor is liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a third party, shall not be construed to negate, abridge, or reduce other rights or obligations of the contractor that would otherwise exist as to a third party or person described in this Section . . .

§ 3.18.2 In addition to and not in limitation of the Contractor's other indemnity obligations, the Contractor hereby accepts and assumes full sole liability for and shall indemnify, protect, and hold harmless the Owner and Architect from and against the payment of the following:

1. all contributions, taxes, or premiums including interest and penalties thereon which may be a liability under the unemployment insurance law of any state, the Federal Social Security Act, Federal, state, county, and/or municipal withholding laws, or any other law, measured on the payroll of or required to be withheld from employees whomsoever employed, engaged in the work to be performed and furnished under this Contract
2. all sales, use, personal property and other taxes including interest and penalties thereon required by any Federal, state, county, municipal, or other law to be paid or collected by the Contractor or any of its Subcontractors or vendors or any other person or persons acting or through or under it or any of them, for any reason on the performance of the work or the acquisition, ownership, furnishing, or use of any materials, equipment, supplies, labor, services, or other items or in connection with the work and
3. all pension, welfare, vacation, annuity, and other benefit contributions payable under or in connection with respect to all persons whomsoever employed, engaged in the work to be performed and furnished under this Contract.

The provided Owner or Architect has, in good faith and to the best of their knowledge, provided Contractor with complete, accurate, reports identifying the presence of any and all hazardous materials on Site as of the date of commencement of the work, Contractor shall indemnify, defend, and hold the Owner harmless from any claim, damage, loss or expense, including, but not limited to, actual attorneys' fees, incurred by the Owner related to any hazardous material, condition or waste, toxic substance, pollution, or contamination brought into the project site or caused or exacerbated by the Contractor or used, handled, transported, stored, removed, remediated, distributed, or dispersed by Contractor.

§ 3.18.3 In the event that any claim is made or asserted, or lawsuit filed or damages or injury arising out of or resulting from the performance of the work, whether or not the Owner or Architect is named as a party, the Contractor shall immediately advise the Owner and Architect, in writing, of such claim or lawsuit and shall provide a full and complete copy of any documents or leadings thereto, as well as a full and accurate report of the acts involved.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section . . . and identified as such in the Agreement. The Term "Architect," "Architect/Engineer," "Engineer," or "Design Professional" as used herein means the Architect or the Architect's authorized representative.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner and Architect.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will act as an Owner's representative during construction until the date the Architect issues the final Certificate of Completion and with the Owner's written concurrence during the correction period. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or more frequently as agreed with the Owner or required by law, to become familiar with the progress and quality of the portion of the work completed, and to determine if the work, when fully completed, will be in accordance with the Contract Documents. Except as otherwise set forth herein or in the Owner/Architect Agreement, the Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures,

or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents. The Architect shall provide all services and duties that may be performed by an "Architect" or "Engineer" in 1937 PA 306 and 1980 PA 299, including but not limited to supervision of construction.

§ 4.2.3 In the absence of the site visits, the Architect will advise the owner informed about the progress and quality of the portion of the work completed, will guard the owner against defects and deficiencies in the work, and promptly report to the owner known deviations from the Contract Documents, known deviations from the most recent construction schedule submitted to the Contractor, and defects and deficiencies observed in the work. Except as required by the owner/Architect Agreement or other Contract Documents, the Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and, except as provided in the agreement between owner and Architect or this document, will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or other persons or entities performing portions of the work. The Architect shall provide all services and duties that may be performed by an "Architect" or "Engineer" in 1937 PA 306 and 1980 PA 299, including but not limited to supervision of construction.

§ 4.2.4 Communications

The owner and Contractor shall endeavor to include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The owner shall promptly notify the Architect of the substance of any direct communications between the owner and the Contractor otherwise materially affecting the project. Communications with the Architect's consultants shall be through the Architect. Communications with Subcontractors and suppliers shall be through the Contractor. Communications with Separate Contractors shall be through the owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates of Payment in such amounts.

§ 4.2.6 The Architect has a right to reject work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have a right to require inspection or testing of the work in accordance with Sections 1.10 and 1.11, whether or not the work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the owner and Architect or, in the absence of an approved submittal schedule, with reasonable promptness as to cause no delay in the work while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions or installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 1.10, 1.11, and 1.12. The Architect's review shall not constitute approval or disapproval of construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. However, should the Architect discover during the course of such review any inaccuracies, incompleteness, or other irregularities, the Architect shall immediately notify the owner of the same to determine an appropriate corrective course of action or notify the Contractor of the same to correct the irregularities.

§ 4.2.8 The Architect will review and recommend or approve Change Orders and Construction Change Directives, and may order minor changes in the work as provided in Section 1.10. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 1.10.3.

§ 4.2.9 The Architect will conduct inspections to determine, with the Owner's concurrence, the date or dates of Substantial Completion and the date of final completion. The Architect will issue Certificates of Substantial Completion pursuant to

Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.8 and issue a final Certificate of Acceptance pursuant to Section 9.8.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site.

§ 4.2.11 The Architect will interpret matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness given the particular circumstances.

§ 4.2.12 Interpretations of the Architect will be consistent with the intent of, and reasonable in view of, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations, the Architect will endeavor to secure faithful performance by the Contractor, and will not be liable for results of interpretations or decisions rendered in good faith and without negligence.

§ 4.2.13 The Architect's interpretations on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness given the particular circumstances. In a separate, the Architect will prepare and issue Supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor. The term "Subcontractor" shall also include Subsidiary Contractors at all tiers and material and equipment suppliers. Each and every subcontract shall be understood to have the Owner as a third party beneficiary, and the Owner shall enforce all third party beneficiary rights permitted by law.

§ 5.1.2 A Subsidiary Contractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as singular in number and means a Subsidiary Contractor or an authorized representative of the Subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect in writing of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect has reasonable objection to any such proposed person or entity or requires additional time for review. All contractual agreements with additional persons or entities serving as a Subcontractor or supplier shall be resubmitted to the Owner as a third party beneficiary, and the Owner shall enforce all third party beneficiary rights not prohibited by law.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed alternate Subcontractor was reasonably capable of performing the Work, despite the Architect's or Owner's

reasonable objection, the Contract Sum and Contract Time shall be increased or decreased by the difference, in any case, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsibly in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity or one previously selected by the Owner or Architect makes reasonable objection to such substitution. The Contractor shall notify the Owner and Architect of any proposed substitution a minimum of ten days prior to such proposed change.

§ 5.3 Subcontractual Relations

Under any appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the contract or to be performed by the Subcontractor, to be bound to the Contractor's terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the contract or to be performed by the Subcontractor so that subcontracting thereon will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the enforcement of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with other Subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement or a portion of the contract is assigned to the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner or case is referred to Section 5.4.2 and only for those subcontract agreements that the Owner accepts, notifying the Subcontractor and Contractor in writing and
- .2 assignment is subject to the prior rights of the Surety, in any case, obligated under and relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be as negotiated by the parties.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance. The Contractor shall be responsible for coordinating the work and with the work of other Contractors, including the Owner's own forces or Separate Contractors, so as to complete the work in accordance with the project time schedule.

§ 6.1.2 When separate contracts are awarded for different portions of the project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Contractor, who shall cooperate with them. The Contractor shall participate with the Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until superseded.

§ 6.1.4 NOT USED.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of any apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. The Contractor shall require the Contractor to notify the Architect of any apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for any discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are attributable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor causes to completed or partial completed construction or to property of the Owner or Separate Contractor as provided in Section 6.2.1.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for protecting and watching as are described for the Contractor in Section 6.2.1.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and allocate the cost among those responsible. The Owner's right to clean up shall in no event be deemed waived, and should the Owner choose not to exercise this remedy, the Contractor necessitating such action shall remain fully responsible for the same.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, only by Change Order, Construction Change Directive, written contract amendment, or order or a minor change in the Work, subject to the limitations stated in this Article and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be issued only by agreement among the Owner, Contractor, and Architect. A Construction Change Directive may be issued by the Owner and Architect and may or may not be agreed to by the Contractor. An order or a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under the applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order or a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement on all of the following:

- .1 the change in the work
- .2 the amount of the adjustment, if any, in the Contract Sum and
- .3 the extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Unless expressly stated otherwise in the Change Order, an agreement on a Change Order shall constitute the Contractor's final position on all matters relating to the change in the work that is subject to the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may issue a Construction Change Directive, without invalidating the Contract, order changes in the work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be issued in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Contractor agrees to an adjustment to the Contract Sum, the adjustment shall be based on one or more of the following methods:

- .1 Mutual acceptance of all measurements reported by competent substantiating data to permit valuation
- .2 Unit prices stated in the Contract Documents or separately agreed upon
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable independent percentage fee or
- .4 As provided in Section

However, the Contract Time shall be adjusted only if the Contractor demonstrates to the Owner that the changes in the work required by the Construction Change Directive adversely affect the critical path of the work.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method of adjustment in the Contract Sum, the Architect shall determine, with the Owner's approval, the adjustment on the basis of reasonable expenditures and savings of those performing the work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section, the Contractor shall prepare and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data.

Unless otherwise provided in the Contract Documents, costs or the increases of this Section . . . shall be limited to a reasonable amount of the following that are attributable to the Contractor:

- .1 Costs of labor, including applicable allowances, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed
- .3 Rental costs of machinery and equipment, excluding ordinary hand tools, whether rented from the Contractor or others
- .4 Costs of permits or bonds and insurance, permits, fees, and sales, taxes, or similar taxes, directly related to the change and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any,

provided in the Construction Change Directive or determining the proposed adjustment in the Contract Sum or Contract Time. Contractor agreements to a Construction Change Directive shall require a follow writing or signature as contemplated in Section

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method of determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed to the Contractor to the owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related or related items are included in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the owner, the Contractor may request a ment or undisturbed or completed under the Construction Change Directive in Applications or a ment. or those undisturbed portions, the Architect will make an interim determination or issues of monthly certification or a ment or those costs and certify or a ment that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost, if agreed to by the owner in writing, shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of the Contractor to disagree and assert a Claim in accordance with Article .

§ 7.3.10 When the owner and Contractor agree in writing with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement on the adjustments in writing, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.3.11 In no event shall the Contractor be entitled to receive, and the contractor hereby waives the right to receive, an extension or an extension of time for additional or changed work, whether partial or fully completed or simply proposed, unless such additional work is authorized by a written Change Order or Construction Change Directive signed by the owner, nor shall the Contractor be obligated to proceed with any such work. Only the owner shall have the right to issue a written Change Order or Construction Change Directive to the Contractor authorizing an addition, deletion or other revision in the scope of the work and/or an adjustment in the Contract Sum or the Construction Schedule.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor elects that the proposed minor change in the work will affect the Contract Sum or Contract Time, the Contractor shall either file a Claim in accordance with Article and continue to implement the change in the work, or ii notify the owner and Architect in writing and shall not proceed to implement the change in the work. Without limiting other restrictions on a ment, if the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives an adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the work.

§ 8.1.2 The date of commencement of the work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. In executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period of obtaining all supplies, materials, tools and equipment necessary to perform the Work and to perform the Work.

§ 8.2.2 The Contractor shall not knowingly, by contract agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. All work shall be completed in sufficient time to allow for clean-up and reparation or repair prior to the Date of Substantial Completion.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 Provided the Contractor submits a written request for an extension not more than fourteen days after the occurrence that gives rise to the delay, if the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or an employee of either, or of a Separate Contractor changes ordered in the Work, fire, government declared emergencies, natural calamities, significant and unusual adverse weather conditions documented in accordance with Section 8.3.1.1, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending litigation, mediation, arbitration or binding dispute resolution, as a legal or other cause that the Contractor asserts, and the Architect determines, still delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine and with which the Owner agrees. Failure of the Contractor to submit a timely request for an extension shall irrevocably waive the Contractor's right to such an extension of time. If the Contract Time is subject to extension pursuant to this paragraph, such extension shall be the exclusive remedy of the Contractor and the Contractor shall not be entitled to recover damages from the Owner.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section shall preclude recovery of damages or delay by the Contractor under other provisions of the Contract Documents. Under no circumstances may the Contractor assert a Claim, cause of action, or other relief against the Owner or delay damages.

§ 8.4 Delay Damage Claims

§ 8.4.1 In the absence of a delay caused by something outside the Contractor's reasonable control, if the Contractor fails to complete its Work on time resulting in loss or damage to the Owner, whether or not liquidated damages are called for in the Contract Documents, the Owner shall be entitled to make a Claim for direct damages caused by the Contractor's delay.

§ 8.4.2 In the event the Contractor is hindered in the commencement or progress of the Work or for any reason someone other than the Owner, and in the event the Contractor claims damages as a direct and proximate consequence thereof including, but not limited to, extended general conditions, overhead, profit, overtime, interest, suspension or other costs or profits whatsoever, then the Contractor shall not assert such claims against the Owner, and as to the Owner, the Contractor's claims of delay damages are hereby waived. The Contractor's sole and exclusive remedy regarding such claims or such delay damages shall be to assert such claims directly against the individual or entity which caused the delay.

In the event delay claims raised against the Owner or for any reason, the Contractor's sole and exclusive remedy is an extension of time to perform the Work or not to exceed the time frame of an approved delay. Under no circumstances is the Contractor entitled to monetary delay damages from the Owner.

§ 8.4.3 Notwithstanding the foregoing, in the event of any delay in the completion of the Contractor's Work or scheduling of the Contractor's Work, including the sequence of that Work which is attributable to the Owner, and if it is determined in a court of competent jurisdiction that the Owner is liable for such delay despite the other terms of this Contract arranging an Owner liability for damages or delay, then the Owner shall be liable to the Contractor for liquidated damages in the amount of not to exceed one hundred Dollars per day, maximum, which shall include all of the Contractor's claims, including by way of example, delays, compressions of schedule, lost productivity, lost profits, lost opportunities, overtime expense, overhead, crowding, tools, equipment, rentals, etc.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable to the Contractor or performance of the Contractor under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or separately agreed upon, and quantities originally contemplated are materially changed so that allocation of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitable adjusted.

§ 9.2 Schedule of Values

The Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the work. The schedule of values shall be prepared in the form, and sorted according to the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and sorted according to the data to substantiate its accuracy as the Owner or Architect may require, and unless objected to by the Owner or Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.2.1 The schedule of values shall be prepared in such manner that the value associated with each major item of work and each subcontracted item of work is shown with materials and labor indicated separately on AIA Document A-310 Application and Certificate of Payment, and AIA Document A-311 Continuation Sheet, or otherwise.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values or completed portions of the work. The Application shall be notarized, indexed, and sorted according to all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and Suppliers, and shall reflect retainage provided for in the Contract Documents. The form of Application and Certificate of Payment shall be AIA Document A-310, Application and Certificate of Payment, sorted according to AIA Document A-311, Continuation Sheet, unless otherwise agreed by the Owner. Applications for Payment are due to the office of the Architect on the designated date of the month. Applications for Payment that are received after the specified date will not be processed until the following month.

§ 9.3.1.1 As provided in Section 9.3.1, such Applications may include requests for payment on account of changes in the work that have been previously authorized by Construction Change Directives, or interim determinations of the Architect, but not yet included in Change Orders. A request for payment of sums related to work regarding Construction Change Directives shall, unless authorized in writing at the time of request, constitute full and complete consent to the Construction Change Directives and to the issuance of a Change Order.

§ 9.3.1.2 Applications for Payment shall not include requests for payment or portions of the work for which the Contractor does not intend to pay a Subcontractor or Supplier, unless such work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 The Contractor shall submit with each monthly Application for Payment an Affidavit that all rolls, bills of materials and equipment, and other indebtedness connected with the work for which the request for payment was submitted and for which the Owner might in any way be responsible have been paid or otherwise satisfied, and a release or waiver of liens arising out of the Contract from each Contractor and/or Subcontractor, materialman, Supplier and laborer or the Contractor addressing all request for payment Applications for Payment submitted for the project.

§ 9.3.1.4 The Contractor must provide copies of the insurance certificates, bonds, and the same or all of the Subcontractors prior to submitting the first Application for Payment.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and stored at the site or separately incorporated in the work. If authorized in advance by the Owner, payment may similarly be made for materials and equipment stored off the site at a location

agreed on in writing. Payment for materials and equipment stored on or off the site shall be conditioned on compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. Payment to Contractor for materials stored off site is discouraged. When circumstances indicate that the Owner's best interest is served by site storage, the Contractor shall make written request to the Owner for approval to include such material costs in the next progress payment. The Contractor's request shall include the following information:

1. A list of the identified materials consigned to the project which shall be clearly identified, giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.
2. Certification that items have been tagged or delivered to the project and that they will not be used on another project.
3. A letter from the Contractor's Surety indicating agreement to the arrangements and that payment to the Contractor shall not relieve either party of their responsibility to complete the project.
4. Evidence of adequate insurance covering the material in storage, which shall name the Owner as additional insured.
5. Costs incurred by the Architect to inspect material in off-site storage shall be paid by the Contractor.
6. Separate receipts shall itemize the materials and their cost which were approved on receipt and remain in off-site storage.
7. When a partial payment is allowed on account of material delivered on the site of the project or in the vicinity thereof under possession and control of the Contractor, but not yet incorporated therein, such material shall become the property of the Owner, and if such material is stolen, destroyed or damaged, or is altered or being used, the Contractor will be required to replace it at its own expense.

§ 9.3.3 The Contractor warrants that title to all or covered by an Application or a payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submission of an Application or a payment all or which certifies or a payment have been reviewed and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, secret interests, or encumbrances, in favor of the Contractor, Subcontractors, Suppliers, or other persons or entities that provided labor, materials, and equipment relating to the project.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate of Payment in the full amount of the Application or a payment, with a copy to the Contractor or (2) issue to the Owner a Certificate of Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.4.2 or withhold certification of the entire Application or a payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate of Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Contractor has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to a payment in the amount certified. The foregoing representations are subject to an evaluation of the Contractor or conformance with the Contract Documents on Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific applications reviewed by the Architect, in writing, together with the certification to which it pertains. However, unless otherwise required by the Owner/Architect Agreement, another Contract Document, or applicable law, the issuance of a Certificate of Payment will not be a representation that the Architect has made a habit of or continues on site inspections to check the quality or quantity of the Contractor reviewed construction means, methods, techniques, sequences, or procedures reviewed copies of revisions received from Subcontractors and Suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money received on account of the Contract Sum. Nothing in this Section 9.4.2 shall be interpreted to reduce or eliminate the Architect's duties as set forth in Section 3.1.9 of the Owner/Architect Agreement, including supervision of construction.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate or Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.5.1 cannot be made. If the Architect is unable to certify a Payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.5.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate or Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate or Payment, in whole or in part, if, in the Architect's opinion, the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.5.1, for any of the following:

1. The Contractor is in breach of the Agreement;
2. Third party claims filed or reasonable evidence indicating probable loss of such claims, unless such claims are covered by the Contractor's insurance;
3. Failure of the Contractor to make payments to subcontractors or suppliers or labor, materials or equipment;
4. Reasonable evidence that the Contractor cannot complete or the performance of the Contract will result in damage to the Owner or a Separate Contractor;
5. Reasonable evidence that the Contractor will not complete within the Contract time, and that the Contractor's performance would not be adequate to cover actual or liquidated damages or the anticipated delay;
6. Failure to carry out the Contractor's obligations in accordance with the Contract Documents;
7. The Contractor not having progressed to the extent set forth in the Application or Payment;
8. Representations of the Contractor are untrue;
9. Failure to conform to Project Schedule;
10. Default in the performance of an obligation to the Owner under another contract or subcontract;
11. Failure to provide sufficient skilled workers.

§ 9.5.2 When the Contractor disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, the Contractor may submit a Claim in accordance with Article 17.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification or Payment under Section 9.5.1, the Owner may, at its sole option, issue a joint check to the Contractor and to a subcontractor or supplier to whom the Contractor failed to make a payment or for other earned or material or equipment items it is owed. If the Owner makes a joint check, the Owner shall notify the Architect and the Contractor shall reflect such a payment on its next Application or Payment.

§ 9.5.5 If the Contractor disputes an determination by the Owner or Architect with regard to an Certificate or Payment, the Contractor shall nevertheless continue to editio shall perform the Work and such dispute shall provide no basis for any manner of suspension of the Contractor's performance of the Work.

§ 9.5.6 Notwithstanding anything herein to the contrary, the Owner has no obligation to advance the Contractor a receipt of a Certificate for Payment for the requested amount, and neither the Architect's failure to issue a Certificate for Payment nor the Architect's failure to notify the Contractor and/or Owner of a withheld Certificate or Payment creates an obligation on the Owner to advance the Contractor. The foregoing sentence shall not operate to limit the right of the Owner to dispute amounts requested by the Contractor or to withhold Payments from the Contractor as provided in the Contract Documents.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate or Payment, the Owner shall make a Payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall advance each Subcontractor, no later than seven days after receipt of a Payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from Payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make Payments to Subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, in practical, information regarding percentages of completion or amounts allocated to the Contractor and action taken thereon by the Architect and Owner on account of portions of the work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has provided Subcontractors and suppliers amounts paid to the Contractor or subcontracted or . If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been provided. Neither the Owner nor Architect shall have an obligation to assist, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Owner may, in its sole discretion, terminate a Contracting Contractor with ten days prior written notice, make direct payments to the Contractor's Subcontractors, suppliers, laborers or claimants relating to labor or material provided to the Contractor or which the Contractor has not provided a waiver of lien, in the event the Subcontractors, suppliers, laborers or claimants threaten to or actually cease providing labor and/or materials or the project such that, in the Owner's determination, progress of the Project and the Project's Schedule are jeopardized. All payments made pursuant to this section shall be considered the same as if paid directly to the Contractor and shall constitute partial payment of the Contract Sum. In the event the Contractor disagrees with the amount provided to be paid to one or more Subcontractors, suppliers, laborers or claimants, the Contractor shall provide a bond in the amount the Contractor believes the Owner will order a, within ten days of receipt of notice, or be barred from making any claim that the amount of the direct payment was incorrect. Payment under this provision shall not jeopardize any other remedy available to the Owner.

§ 9.6.6 A Certificate of Payment, a progress payment, or partial or entire set or occurrence of the project the Owner shall not constitute acceptance or not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full amount of the Contract Sum, payments received by the Contractor or for or provided Subcontractors or provided suppliers shall be held by the Contractor or those Subcontractors or suppliers who performed or provided materials, or other, under contract with the Contractor or which a payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create an individual liability or tort liability on the part of the Contractor or reach a trust, or entitle any person or entity to an award of punitive damages against the Contractor or reach the remedies of this provision.

§ 9.6.8 The Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier or another tier. Upon receipt of notice of a lien claim or other claim or a payment, the Owner shall notify the Contractor. If a recorded judicial court, when required, the Contractor may be required to assist in a settlement or the project against which the lien or other claim or a payment has been asserted.

§ 9.6.9 Subject to applicable law, in a retention in an interest or an other arrangement or proceeding regarding insolvency, assignment or the benefit of creditors, trust, chattel mortgage, or similar state or federal proceeding, whether voluntary or involuntary, shall be filed with respect to the Contractor, the Owner may withhold the final balance, or any other payments, whether or not an application or progress payment has been provided, until expiration of the period of any guarantees or warranties required by the Contractor, and the Owner may withhold such funds the amount necessary to satisfy any claims or costs that otherwise would have been covered by such guarantees or warranties.

§ 9.7 Failure of Payment

In violation of the provisions under the Contract Documents, including these General Conditions, the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the undischarged amount asserted by the Contractor in its Application for Payment or awarded by a court, then the Contractor may, upon twenty-one additional days' written notice to the Owner and Architect, stop the work until a payment of the undischarged amount owing has been received. The Contract time shall be extended accordingly and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents. The Contractor acknowledges the Owner's right to dispute in

good faith amount retained by the Contractor, and, irrespective of the Architect's issuance of a Certificate of Completion, the Owner's right to withhold payments from the Contractor, including, without limitation, to correct or that fails to conform with the Contract Documents or as an offset or recoupment to recover the cost of damages incurred by the Owner due to the Contractor's breach of the Contract or a wrongful or negligent act or omission of the Contractor.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents and when all required occupancy permits, if any, have been issued, so that the Owner can occupy or utilize the Work or its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof or its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item immediately. In such case, the Contractor shall then submit a request for another inspection to the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance and indicate the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor or their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of the Architect, the Owner shall make a payment of retainage applicable to the Work or designated portion thereof. Such a payment shall be adjusted or forfeited if that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.6 Notwithstanding Sections 9.8.1 and 9.8.2, as a condition precedent to establishing the date of Substantial Completion, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected (a "punch list"). The Contractor shall respond immediately to correct Work deficiencies and/or punch list items. Should the Contractor fail to make corrections in a timely fashion, but not later than fifteen calendar days from the date of Substantial Completion or notification of the required corrections, whichever is earlier, such Work may be corrected by the Owner at the Contractor's sole expense, and any remaining payments due to the Contractor shall be withheld by the Owner.

§ 9.8.7 The Contractor shall promptly notify the Architect, in writing, when the Work deficiencies and/or punch list items are completed. Upon the review of the Work by the Architect after such notification by the Contractor, if Work deficiencies and/or punch list items shall continue to exist, the Contractor shall reimburse the Owner its cost plus ten percent (10%) overhead and profit on any cost incurred by the Owner, including the Architect's fees for reinspection of the Work. Failure to pay such costs within ten days of receipt of a demand regarding the same shall permit the Owner to pay such costs out of retainage held by the Owner on the Contractor's contract.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated separately in an agreement with the Contractor, provided such occupancy or use is consented to by the Architect and authorized by the appropriate authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete. The Contractor shall proceed with the Work in such a manner as reasonable directed and shall cooperate with the Owner to limit interruptions.

§ 9.9.2 Immediately prior to each partial occurrence or, if necessary, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the work to be tested in order to determine and record the condition of the work.

§ 9.9.3 Unless otherwise agreed upon, partial occurrence or, if necessary, of a portion or portions of the work shall not constitute acceptance or not complying with the requirements of the Contract Documents.

§ 9.9.4 An agreement as to the acceptance or non-compliance or not complying with the requirements of the Contract Documents shall be in writing in the form of a Change Order, acceptable to the Owner's authorized representatives and signed by all parties.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's written notice that the work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the work acceptable under the Contract Documents and the Contract Documents, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the work has been completed in accordance with the Contract Documents and that the entire balance owed to and due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect an affidavit that all tools, bills of materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld where the Owner has been paid or otherwise satisfied, a certificate indicating that insurance required by the Contract Documents to remain in force after final payment is currently in effect, a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, consent of surety, if any, to final payment, documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, an affidavit that states the work is fully completed and performed in accordance with the Contract Documents, in the event of Contractor insolvency, at the Owner's option, an order entered by the court having jurisdiction of the Contractor's insolvency proceeding authorizing such a payment, a general release executed by the Contractor on a form provided by the Architect, all close-out documents, all warranties collected and provided in an acceptable manner, and all required by the Owner, other data establishing a payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all moneys that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and actual attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the work, final completion thereof is materially delayed through no fault of the Contractor or issuance of Change Orders affecting final completion, and the Architect so informs the Owner, the Owner shall, upon Application by the Contractor and certification by the Architect, and without terminating the Contract, make a payment of the balance due or that portion of the work fully completed, corrected, and accepted. If the remaining balance or portion not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to a payment of the balance due or that portion of the work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such a payment. Such a payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 Claims already asserted as of the date of final payment and unsettled

.2 Failure of the work to comply with the requirements of the Contract Documents and resulting demands and Claims asserted in accordance with the Contract Documents

- .3 terms of all warranties required by the Contract Documents or provided at law or in equity or
.4 a duty imposed by the owner, is permitted by the Contract Documents, a terminal payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of all claims of the Contractor except those previously made by the Contractor in writing, including Claims ending as of the final payment date, or identified by the Contractor as unsettled at the time of final Application for payment and specifically referenced as being an exception to the waiver contained in this section.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall continuously maintain adequate protection of all Work from damage and shall protect the Owner's property from injury or loss. The Contractor shall make good any such damage, injury or loss at no cost to the owner, except to the extent directly caused by agents or employees of the owner. The Contractor shall adequately protect the owner and adjacent property as required by law, the Contract Documents, or as otherwise required, to cause no damage to the owner and adjacent property during the execution of the work. This requirement shall also apply to structure above and below ground as conditions of the site require. The Contractor shall also provide recommendations and information to the owner regarding the assignment of responsibilities or safety precautions and programs to the Subcontractors and responsibilities or safety precautions and programs to the Subcontractors and the owner or the safety of the owner, and the general public, temporary facilities and equipment, materials and services or common use of Subcontractors. The Contractor shall verify that the requirements and assignment of responsibilities are included in the proposed Contract Documents.

§ 10.1.2 The Contractor is solely responsible to the owner for health and safety at the project site and, accordingly, shall be solely responsible for initiating, monitoring, maintaining and supervising all safety precautions and programs in connection with the performance of the work. The foregoing does not relieve the Subcontractors of their responsibility to the Contractor or the safety or performance of their work in accordance with all applicable laws.

§ 10.1.3 The Contractor shall develop and implement a health and safety plan that complies with all applicable laws covering all activities on the project Site except those activities performed solely by the owner. The Contractor shall provide the owner a copy of such health and safety plan prior to commencement of work. The owner shall have no duty to review the plan and shall assume no duty of doing so.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take every reasonable precaution for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the work and other persons who may be affected there
- .2 the work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Supplier and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walls, elements, roads, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall take all reasonable safety precautions with respect to its work and work of others, shall comply with all standard industry safety measures and shall comply with all applicable laws, ordinances, rules, regulations and orders of any local authority and all other requirements of the Contract Documents, including those applicable to the safety of persons or property. The Contractor shall be responsible for the safety of all of the Contractor's employees and the safety of all of the Contractor's Subcontractors, suppliers, and their employees. The Contractor shall report in writing to the Architect and in writing to any Contractor's or its Subcontractor's employees at the site within one day after the occurrence of such injury.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable, necessary and appropriate safeguards for safety and protection, including posting danger

signs and other warnings against hazards from logging, safety regulations and notifying the owners and users of adjacent sites and utilities of the hazards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary or execution of the work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly trained personnel. The Contractor shall be solely and fully responsible for and all damage claims and or defense of all actions against the owner relating to such explosives, hazardous materials and/or unusual methods.

§ 10.2.5 The Contractor shall be fully responsible for damage and loss to property referred to in Sections 10.2.1 and 10.2.2 caused in whole or in part by the Contractor, a subcontractor, a specialist contractor, or an employee directly or indirectly employed by any of them, or by any one or whose acts the contractor is liable and for which the Contractor is responsible under Sections 10.2.1 and 10.2.2. The Contractor may make a claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the owner or Architect or an employee directly or indirectly employed either of them, or by any one or whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 10.2.1.

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

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If the Contractor suffers injury or damage to person or property because of an act or omission of the owner, or of others or whose acts the owner is legally responsible, written notice of the injury or damage, whether or not insured, shall be given to the owner within a reasonable time not exceeding 30 days after discovery. The notice shall provide sufficient detail to enable the owner to investigate the matter. This provision shall be for investigatory purposes only and shall not eliminate or reduce a party's obligation to pursue claims. The Contractor's failure to do so shall be an irrevocable waiver of any claim arising out of such injury or damage. In injury or damage to persons or property suffered by the owner because of an act or omission of the Contractor, or others or whose acts the Contractor is legally responsible, shall be subject to the limitation periods established by Michigan law.

§ 10.2.8.1 The Contractor causing damage to the owner or another shall be responsible for the repair and replacement of such damaged property. All charges shall be made against the Contractor of the damaging Contractor when corrections are not made promptly.

§ 10.2.8.2 If the Contractor or a subcontractor chooses to use any systems, equipment, facilities, or services which have been incorporated in the project as a permanent part thereof and, other than the Contractor shall assume full responsibility for damages caused to said systems, equipment, facilities or services, and have damages repaired as required, so that in no case will the performance of the specified systems, equipment, facilities or services be diminished from the specified criteria as a result of such use.

§ 10.2.9 The Contractor acknowledges that the safety of the Owner's students, employees and guests is of the utmost importance. The Contractor will take no action which would jeopardize the safety of the Owner's students, employees and guests and, without the Owner's written approval, shall take no action which would interfere with the Owner's activities. Without limiting the foregoing sentence, the Contractor shall comply with all laws applicable to student and/or school safety.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and it is reasonable precautions will be inadequate to prevent foreseeable injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyls (PCBs), encountered on the site by the Contractor, the Contractor shall, upon recognizing

the condition, immediately stop work in the affected area and notify the Owner and Architect in writing of the condition.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner, in its discretion, shall obtain the services of a licensed laborer to verify the presence or absence of the material or substance reported to the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall, as a courtesy, furnish in writing to the Contractor and Architect the names and affiliations of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. When the material or substance has been rendered harmless, work in the affected area shall resume on written agreement of the Owner and Contractor. Change order, the Contract time shall be extended as appropriate to address shutdown, delay, and start-up.

§ 10.3.3 NOT USED.

§ 10.3.4 The Owner shall not be responsible under this Section for hazardous materials or substances the Contractor brings to the site. To the extent the Contract Documents require the removal, transport and disposal of hazardous materials, the Contractor agrees that it assumes responsibility for said tasks as part of the Contract.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or wherever the Contractor fails to perform its obligations under Section 10.3.2, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 NOT USED.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's reasonable discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 10 and Article 11. Nothing in this paragraph shall be construed as relieving the Contractor from the cost and responsibilities for emergencies covered here.

§ 10.5 Notification of Utility Companies

§ 10.5.1 At least five working days prior to the start of work in areas which may include existing utility lines, the Contractor shall notify the MISSDI notification system, as legally required and, if applicable, an Registered Utility Protection Service of the utility company associated with the planned work certified mail with return receipt requested.

§ 10.5.2 The utility company should, upon receipt of notice, state, mark or otherwise designate the location and depth of their lines, or temporarily move the lines. The Contractor shall wait for the applicable utility to state and/or mark its utility lines before commencing the relevant work.

§ 10.5.3 The Contractor shall immediately report to the respective utility company any area or leak in its lines, or any dent, gouge, groove or other damage to the utility line or to its coating or cathodic protection made or discovered in the course of the work.

§ 10.5.4 The Contractor shall immediately alert the Owner, Architect and occupants of nearby premises of any and all emergencies caused or discovered in the utility lines in the course of the work.

§ 10.6 Security

§ 10.6.1 All construction participants, including the Contractor, Architect, Subcontractors, etc., shall cooperate with the Owner's security personnel and shall comply with all of the Owner's security requirements. Such requirements shall include, without limitation, if requested by the Owner, delivering to the Owner's security personnel, prior to the commencement of the work on each day, a list of all personnel who will be permitted access to the work. The foregoing, however, shall not relieve the Contractor of any obligation to provide a safe and secure work place or all

parties entering the Project Site. The Contractor shall be responsible to implement commercially reasonable data security protection measures to protect the Owner's networks and data when performing technology related work.

§ 10.7 Fire Protection

§ 10.7.1 The Contractor shall maintain free access to the building areas for fire fighting equipment and shall at no time block main roadways or fire aisles without providing adequate alternative roadways and means of entrance for fire fighting equipment, including fire department trucks, where applicable.

§ 10.7.2 The Contractor shall at all times cooperate with the Owner and with the municipal fire department in ordering of the means of entrance and changes to the roadways or fire aisles as needed to provide fire department access to and around the Project Site.

§ 10.7.3 The Contractor shall, during the entire construction period and until the completion of the work, provide and maintain all material, equipment, and services necessary for an adequate fire protection system, which shall meet the approval of the Owner and/or the Architect. The system shall, at a minimum, meet the requirements set forth in the Contract Documents and applicable laws. These requirements shall be augmented and/or the installations relocated, as may be necessary to meet, at all time, the demands of adequate protection in all areas and shall not be reduced prior to the completion of the work with the written approval of the Owner and/or the Architect.

§ 10.8 Environmental Statement and Responsibility of Contractors and Sub-Contractors

§ 10.8.1 It shall be the responsibility of the Contractor to pay and all costs incurred in an award related to clean up related to an environmental hazard created by means of release, spill, leak or any other means of contamination caused by accident or negligence that is the responsibility of Contractor or its subcontractors or other agents.

§ 10.8.2 It shall be the responsibility of the Contractor to dispose of any rods and/or material in strict compliance with applicable federal, state, and local laws e.g., Environmental Protection Agency, Michigan Department of Natural Resources, etc.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as required by law and as otherwise described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies rated A or better A.M. Best Company and lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Owner hereby requires the Contractor to furnish bonds covering faithful performance of the Contract and a payment of obligations arising thereunder, each in the amount of the Contract Sum and in accordance with applicable law, on the date of execution of the Contract. The Owner may also require, through the Contract Documents or otherwise, that an additional contract amount, more or less shall also include a payment and performance bonds each in the amount of the Contract Sum. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located. The Contractor shall obtain and provide to the Owner copies of any and all bonds required by the Contract prior to Contractor beginning performance pursuant to the Contract. The Contractor's obligation to provide such bonds shall not be waived in any fashion, including any failure to secure such bonds prior to Contractor beginning performance pursuant to the Agreement.

§ 11.1.2.1 The Contractor's liability insurance shall be not less than the following:

- | | | | |
|----|---------------------------------|-----------------------|-------------------|
| .1 | General Requirements | | |
| | a. | Worker's Compensation | Statutory |
| | | Employer's Liability | , , Each Accident |
| | | | , , Each Employee |
| | | | , , Policy Limit |
| .2 | Comprehensive General Liability | | |

- a. Professional Indemnity, , Each occurrence
- Personal Indemnity, , Aggregate
- Professional Indemnity, , Each occurrence
- Professional Indemnity, , Aggregate
- 3. Automobile Liability
 - a. Professional Indemnity, , Each person
 - Professional Indemnity, , Each occurrence
 - Professional Indemnity, , Each occurrence
- 4. Independent Contractors, , Each occurrence
- 5. Products and Complementary Operations, , or one year, commencing with issuance of final Certificate of completion
- 6. Contractual Liability, , Each occurrence
- 7. Assets and Attorneys' Fees Liability, , per Claim
- 8. Pollution, , Aggregate
- 9. Commercial Coverage, ,

§ 11.1.3 In the event of an injury or damage to a potential beneficiary of bonds covering a project or obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 For all insurances in which the Contractor is obligated to have its insurance company name the Owner, Architect and Architect's consultants as additional insured, the Contractor shall require such insurance company to add to the policy the following clause: "The insurance is provided to the Additional Insured as primary insurance. If the Additional Insured has other insurance which is applicable to the loss on an excess or contingent basis, the amount of the insurance company's liability under this policy shall not be reduced by the existence of such other insurance." Should the Contractor's insurance costs increase due to adding the Architect and/or Architect's Consultants as additional insureds, and should such costs be passed on to the Owner, the Architect and Architect's Consultants, as applicable, shall reimburse the Owner for such additional costs.

§ 11.1.5 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Immediately after the Contractor becomes aware of an impending or actual cancellation or expiration of an insurance required by the Contract Documents, but in no event less than the sooner of three days after becoming aware or the coverage act all lapsing, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration, including the Contractor's plan to immediately procure replacement insurance as required by the Contract Documents to avoid any lapse in coverage. Contractor's failure to do so is a material breach of this Agreement, shall entitle the Owner to purchase replacement insurance at Contractor's sole cost, and shall subject the Contractor to an award of all damages related to its failure to comply with its required insurance obligations. Further, upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Contractor, have the right, but not the obligation, to stop the project or until the lapse in coverage has been corrected. The Contractor's procurement of replacement coverage shall not constitute a breach of the Contractor's obligation to provide an agreed coverage.

§ 11.2 **Owner's Insurance**

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the project is located. This policy will include an tools, equipment, scaffolding, glass, etc., owned or rented by the Contractor or Subcontractors and materials stored on the site, but not incorporated into the project. The Contractor shall be responsible for protecting all project until the Date of Final Completion is established by the Architect/Engineer. The Contractor shall replace any or damaged before Final Completion. The Contractor may assume the risk itself or obtain insurance in amounts it deems sufficient.

§ 11.2.2 **Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the

Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may obtain insurance of reasonable type and coverage amount that will protect the interests of the Contractor, Subcontractors, and S/S Contractors in the Work and the Parties shall negotiate an adjustment to the Contract Sum and Contract Time. Proportional Insurance provided by the Owner will cooperate only if incorporated into the construction and will not cover tools, equipment, or other property owned, leased, rented, or borrowed by the Contractor, Subcontractor, S/S Contractor, or others.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of an approved insurance policy under the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor, the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been corrected by the procurement or replacement coverage either by the Owner or the Contractor and the Contract Time and Contract Sum shall be negotiated. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner as a separate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 All Parties referenced in this General Conditions or otherwise related to this project acknowledge and agree that the Owner is not waiving any rights its insurers may have to subrogation. To the extent any term in the Contract Documents contravenes this provision, such term is void and inoperative.

§ 11.3.2 NOT USED.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the approved insurance policy under the Agreement shall be adjusted by the Owner as adjuster and made available to the Owner as adjuster or the insurers, as their interests may appear, subject to requirements of an applicable mortgagee clause and of Section . . . The Owner shall allocate the Architect and Contractor their respective shares of insurance proceeds received by the Owner, and a separate agreement between the Architect and Contractor shall make arrangements to their consultants and Subcontractors in similar manner. The Owner shall use its best efforts, with consultation of the Architect, to reach a quick and fair settlement or all interested Parties, with the insurance companies after a loss.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall endorse the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions hereafter, in no other agreement is made or the Owner does not terminate the Contract or convenience, the Owner and Contractor shall execute a Change Order or reconstruction of the damaged or destroyed Work in the amount allocated or that is lost. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 11 of the Contract and the Contractor shall file a claim under Article 11.1 ending resolution of any dispute, the Owner may issue a Construction Change Directive or the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, in writing, be reported to the Architect, encircled by the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time or Contract Sum.

§ 12.1.2 If a portion of the work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request with the Owner's consent to see such work and it shall be provided to the Contractor. If such work is in accordance with the Contract Documents, the Contractor shall be entitled to a negotiated adjustment to the Contract Sum and Contract Time as may be appropriate. At the time the Owner's consent is sought as described herein, the Architect shall notify the Owner that additional costs may apply if the work is in accordance with the Contract Documents. If such work is not in accordance with the Contract Documents, the costs of uncovering the work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

It is understood that the correction of work, either before or after Substantial Completion, shall occur without extension of the Contract Time, without increase in the Contract Sum, and without separate contingencies.

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct or rejected the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not articulated, installed or completed. Costs of correcting such rejected work, including work of other Contractors and Subcontractors, compensation of consultants, any delay or related damages, attorneys' fees incurred by the Owner, additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. The Owner shall have the right to charge the Contractor or any such costs and expenses and to deduct such amounts from any retainments due the Contractor.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 12.2.1, within one year after the date of Substantial Completion of the work or designated portion thereof or after the date of commencement of warranties established under Section 12.2.2, or terms of an applicable special warranty required by the Contract Documents, any portion of the work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously signified in writing to the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. If the Contractor fails to correct nonconforming work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 12.2.2.2.

§ 12.2.2.2 The one year period of correction of work shall be extended with respect to portions of work first performed after Substantial Completion the period of time between Substantial Completion and the actual completion of that portion of the work.

§ 12.2.2.3 The one year period of correction of work shall not be extended to correct work performed by the Contractor pursuant to this Section 12.2.2.

§ 12.2.3 The Contractor shall remove from the site portions of the work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the work or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2.2 or other provisions of the Contract Documents establishing a "correction warranty" or other similar concept shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents, including, without limitation, Section 12.2.2.1. Establishment of the one year period of correction of work as described in Section 12.2.2.1 relates only to the specific obligation of the Contractor to correct the work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the work.

§ 12.2.6 The Contractor shall respond immediately to correct or deficiencies and/or punch list items. Failure to correct or deficiencies and/or punch list items in a timely fashion shall be a substantial breach, and the Owner

may terminate the Contract immediately. The Owner's right of termination in this Section 12.2.6 is separate and distinct from the right of termination in Section 12.2.5. Whether or not the Contract is terminated, if the Contractor fails to make corrections in a timely fashion, such or may be corrected by the Owner, in its sole discretion, at the Contractor's expense and the Contract Sum may be adjusted by back charge and/or withholding of retainments due to the Contractor accordingly. The Contractor shall promptly notify the Architect in writing when minor deficiencies and/or punch list items are completed. Upon review of the work by the Architect, a written notification to the Contractor, of deficiencies and/or punch list items shall continue to exist, the Contractor shall reimburse the Owner for any costs incurred by the Owner, plus ten percent (10%) overhead and profit, as well as the Architect's fees or reinstatements of the work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner refuses to accept work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made. The acceptance of nonconforming Work by the Owner shall be by written Change Order signed by the Owner's authorized representative. Acceptance of nonconforming work may only occur pursuant to such written Change Order.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the State of Michigan in all respects, except that Claims and causes of action or breach of the Contract Documents brought by the Owner shall not be deemed timely filed within six years of substantial completion of the entire project.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation on duties, obligations, rights, and remedies otherwise imposed or available under law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or default under the Contract, nor shall such action or failure to act constitute a ratification or acquiescence in a breach thereunder, except as expressly and specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the work shall be made as required by the Contract Documents and applicable laws, statutes, ordinances, codes, rules, and regulations or law orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present or such proposed results. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until a tender is received or negotiations concluded. The Contractor shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written

authorization from the owner, instruct the Contractor to make arrangements for such additional testing, inspection, or a proposal, an entity acceptable to the owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present or such procedures. Such costs, except as provided in Section . . . , shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or a proposal under Sections . . . and . . . reveal any of the portions of the work to comply with requirements established in the Contract Documents or applicable law, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or a proposal shall, unless otherwise required in the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or a proposal required in the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date a payment is due at the rate the parties agree on in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the project is located. For an late payments by the owner, the interest rate shall not exceed five percent per annum see MCL

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the work is stopped or a period of consecutive days or reasons within the Owner's control and through no act or fault of the Contractor, a Subcontractor, a Supplier, contractor, their agents or employees, or any other persons or entities performing portions of the work, or any of the following reasons:

1. Issuance of an order of a court or other public authority having jurisdiction that requires all or to be stopped
- 2.
3. Because the owner has not made a payment on an undischarged Certificate of Payment within the time stated in the Contract Documents, subject to stipulated withholding of a payment as described herein or in the Contract Documents or
4. The owner has failed to furnish to the Contractor reasonable evidence as required in Section . . .

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Supplier, contractor, their agents or employees, or any other persons or entities performing portions of the work, repeated suspensions, delays, or interruptions of the entire work or the owner as described in Section . . . , constitute in the aggregate more than percent of the total number of days scheduled for completion, or days in an period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the owner and Architect, terminate the Contract and recover from the owner a payment or fee earned, as well as reasonable overhead and profit on work not earned, and costs incurred in connection with such termination.

§ 14.1.4 If the work is stopped or a period of consecutive days for reasons within the Owner's control and through no act or fault of the Contractor, a Subcontractor, a Supplier, contractor, or their agents or employees or any other persons or entities performing portions of the work because the owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the work, the Contractor may, upon seven additional days' written notice to the owner and the Architect, terminate the Contract and recover from the owner as provided in Section

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The owner may terminate the Contract if the Contractor

- .1 refuses or fails to supply enough materials or labor to the project or materials to the project or negatively impacting the project and/or the related schedule
- .2 fails to make a payment to subcontractors or suppliers in accordance with the respective agreements between the Contractor and the subcontractors or suppliers
- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority
- .4 otherwise is guilty of substantial breach or a violation of the Contract Documents or
- .5 the Contractor fails to prosecute the work or an art thereof with promptness and diligence, or goes into arrears, liquidation, makes an assignment or the benefit of creditors, enters into a composition with its creditors, or becomes insolvent.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the owner may, without recourse to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, three business days' notice, terminate the Contractor's right to proceed with the Work, or such part of the Work as to which such defaults have occurred, and may take any one or more of the following actions:

- .1 Evict the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor
- .2 Accept assignment of subcontracts pursuant to Section 14.2.1 and
- .3 Finish the work whatever reasonable method the owner may deem expedient. Upon written request of the Contractor, the owner shall furnish to the Contractor a detailed accounting of the costs incurred by the owner in finishing the work.

In the event the Contractor's surety bond requires notice of intent to declare a default of the Contractor and if such bond notice is provided to the owner, such notice shall be adequate to satisfy the three day written notice described above in this Section.

The three day notice period identified in this Section does not give rise to an opportunity for the Contractor to cure the cause for termination. Further, the Owner's failure to properly follow the termination procedure shall not be a substantial or material breach of the Contract or the Owner's obligations.

§ 14.2.3 When the owner terminates the Contract or one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the work is finished.

§ 14.2.4 In the event of termination of the Contract, the Contractor shall be responsible for the costs of finishing the work, including completion of the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner in pursuing termination and completion of the work, including actual attorney and legal fees and costs, and not necessarily waived, such expenses shall be paid to the Contractor. If such costs and damages exceed the bid amount, the Contractor shall pay the difference to the owner. The amount to be paid to the Contractor or owner, as the case may be, shall be certified by the Initial Decision Maker, upon a litigation, and this litigation or award shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the work, in whole or in part or such period of time as the owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted or increased in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the contract

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, and another cause for which the Contractor is responsible or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the owner in the notice
- .2 take actions necessary, or that the owner may direct, for the protection and preservation of the work and
- .3 execute or direct to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work performed and costs incurred as a result of the termination.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion on the part of either party, as a matter of right, a demand of money, a change in the Contract time, or other relief with respect to the terms of the Contract, including, but not limited to, additional sums, additional time or performance, or damages or delay. The term "Claim" also includes other disputes and matters in question between the owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section . . . does not require the owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents. The Contractor shall not knowingly (as "knowingly" is defined in the Federal False Claims Act, 31 USC 3729, *et seq.*) present or cause to be presented a false or fraudulent Claim. As a condition precedent to making a Claim by the Contractor, the Claim shall be accompanied by an affidavit sworn to before a notary public or other person authorized to administer oaths in the State of Michigan and executed by an authorized representative of the Contractor, which states that, "The Claim which is submitted herewith complies with paragraph . . . of the General Conditions, as amended, which provides that the Contractor shall not knowingly present or cause to be presented a false or fraudulent claim." Claims of the owner shall be governed by the relevant Michigan statutory limitations period, excluding fraudulent claims which shall be controlled by the contract documents.

§ 15.1.2 Time Limits on Claims

The owner and Contractor shall commence all Claims as set forth herein and subject to law and shall preserve all causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the periods specified by applicable law, but in any case not more than two years after the date of Substantial Completion of the work. The owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section . . . The owner shall commence all claims and causes of action in accordance with Section . . . and Section . . . , regardless of any other time frames identified in the Contract Documents. The Contractor shall commence all Claims and causes of action in accordance with Section . . . and Section . . . , other provisions of the Contract, and in accordance with Michigan law.

§ 15.1.2.1 Regardless of any provisions to the contrary, the limitations period with respect to any Claim or cause of action by the owner with respect to defective or nonconforming work shall not commence until the discovery of such defective or nonconforming work by the owner. See also Section . . .

§ 15.1.2.2 Surety Notice and Prior Approval

Except where otherwise expressly required by the terms of the Agreement or the General Conditions, the exercise by the owner of any contractual or legal right or remedy without prior notice to or approval by the Contractor's surety shall in no way prohibit the Owner's ability to pursue such right or remedy. Further, pursuit of such a right or remedy without prior notice to or approval of the surety shall in no way compromise, limit or bar any claim by the owner against a surety bond of the Contractor.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by the Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the work set forth in Section . . . , shall be initiated by notice to the owner and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the

Initial Decision Maker. Claims the Contractor shall be initiated within 30 days after occurrence of the event giving rise to such Claim or within 30 days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later. The Contractor's failure to timely and properly initiate a Claim shall be an absolute and irrevocable waiver of such Claim and any cause of action. Claims and causes of action the owner shall be governed by the applicable statute of limitations period, except when a provision of the Contract Documents provides a longer period. The parties acknowledge, understand, and agree that the Contractor's requirement to file a Claim is critical to the project, as Contractor Claims often affect the project schedule and/or project budget, and that the deadline and waiver applicable to Contractor Claims is a material inducement to the owner entering into an agreement with the Contractor.

§ 15.1.3.2 NOT USED.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim or cause of action, including mediation, arbitration and/or litigation, as applicable, except as otherwise agreed in writing or as provided in Section 15.1.4.2 and Article 15.1, the Contractor shall proceed diligently with performance of the Contract and the owner shall continue to make undisputed payments in accordance with the Contract Documents.

§ 15.1.4.2 NOT USED.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim or an increase in the Contract Sum, written notice as provided in Section 15.1.5.1 shall be given before proceeding to execute the portion of the work that is the subject of the Claim. Failure to provide such notice shall serve as an absolute bar against a Claim or cause of action or such an increase in the Contract Sum. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 15.1.5.2. A project delay shall not be a basis for a Claim or cause of action or additional cost to the Contractor. Delays may be remedied only through an extension of time per Sections 15.1.5.3 and 15.1.5.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim or an increase in the Contract Time, written notice as provided in Section 15.1.6.1 shall be given. The Contractor's Claim shall include an estimate of the allowable effect of delay on progress of the work due to the increase in Contract Time so that. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim or additional time, such Claim shall be documented with data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor waives Claims and/or causes of action against the owner or consequential damages arising out of or relating to this Contract. This waiver includes, without limitation, damages incurred by the Contractor or principal office employees including the compensation of personnel stationed there, or losses of financing, business and reputation, and or loss of profit, except anticipated profit arising directly from the work.

This waiver is applicable, without limitation, to all consequential damages due to either party's termination. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims of the Contractor shall, and Claims of the owner may, be referred to the Initial Decision Maker or initial interrelation. The Architect will serve as the Initial Decision Maker. Except for those Claims excluded by this Section 15.2.1, an initial interrelation shall be required as a condition precedent to mediation, arbitration and/or litigation of any Claim brought by the Contractor against the owner. If an initial interrelation has not been rendered within 30 days after a Contractor required or owner requested Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without an interrelation.

having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: request additional supporting data from the claimant or a response with supporting data from the other party, reject the Claim in whole or in part, approve the Claim, suggest a compromise, or advise the parties that the Initial Decision Maker is unable to resolve the Claim. If the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to interpret the Claim. Within ten days of a written request, the Contractor shall make available to the Owner or its representatives all of its books, records, or other documents in its possession or to which it has access relating to a Claim and shall require its Subcontractors, regardless of tier, and suppliers to do the same.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering an interpretation. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either provide a response on the requested supporting data, advise the Initial Decision Maker when the response or supporting data will be furnished, or advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, in any event, the Initial Decision Maker will, based on its interpretation, either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial interpretation approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial interpretation shall be in writing, state the reasons therefor and notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any recommended change in the Contract Sum or Contract Time or both. If the Claim is timely and properly asserted, the initial interpretation shall be subject to the parties' agreed-upon dispute resolution process.

§ 15.2.6 NOT USED.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner, Architect or Initial Decision Maker may, but is not obligated to, notify the surety, in any event, of the nature and amount of the Claim. If the Claim relates to a possible default of a Contractor's default, the Owner, Architect or Initial Decision Maker may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.3 Mediation

§ 15.3.1 Except as stated in this Agreement or otherwise agreed in writing, the parties, Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided in Sections . . . and . . ., shall be subject to mediation as a condition precedent to the parties' agreed-upon dispute resolution process.

§ 15.3.2 The parties shall endeavor to resolve their Claims through mediation which, unless the parties mutually agree otherwise, shall be administered through the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request shall be made concurrently with the commencement of the parties' agreed-upon dispute resolution proceedings. In such event, mediation shall proceed in advance of such proceedings, which shall be stayed pending mediation or a period of days from the date of filing, unless stayed or a longer period agreement of the parties or court order. All limitations periods shall be tolled during the mediation process.

§ 15.3.3 NOT USED.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereon.

§ 15.4.4 Consolidation or Joinder

The Contractor further agrees to include similar dispute resolution provisions in all agreements with the S contractors, suppliers, and independent contractors and consultants retained for the project and to require them to include a similar dispute resolution provision in all agreements with S contractors, all subconsultants, suppliers or fabricators so retained, thereby providing for a consistent method of dispute resolution between the parties to those agreements. Subject to the other limitations periods identified in these General Conditions which are understood to govern over this sentence, no demand for mediation or arbitration shall be made after the date when the applicable statute of limitation would bar legal or equitable proceedings. During the pendency of an mediation or arbitration, all applicable limitations periods shall be tolled until the conclusion of that process.

With the exception of matters solely dealing with the Contract, the owner reserves the right in its discretion to require consolidation or joinder of an mediation or arbitration arising out of or relating to this Agreement with another mediation or arbitration involving a person or entity not a party to this Agreement in an event the owner elects such consolidation or joinder is necessary in order to resolve a dispute or avoid duplication of time, expense or effort. With the exception of matters solely dealing with the Contract, in the event the owner is involved in a dispute which is not subject to mediation or arbitration involving a person or entity not a party to this Agreement, the mediation and arbitration provisions of this article shall be deemed to be void and nonexistent in the event the owner, in its discretion, determines the Contractor should become a party to that dispute or otherwise. An mediation or arbitration hearing shall be held in the general location where the project is located, unless another location is mutually agreed upon.

Modified / / m



TECHNICAL SPECIFICATIONS
FOR
**NEWCOMER CENTER REMODELING
LANSING SCHOOL DISTRICT
LANSING, MICHIGAN**

MARCH 22, 2024

A/E NO. 2616-04

OWNER

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519 WEST KALAMAZOO STREET
LANSING, MICHIGAN 48933
(517) 755-1000

ARCHITECTS/ENGINEERS

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260533.13	CONDUIT FOR ELECTRICAL SYSTEMS
260533.16	BOXES FOR ELECTRICAL SYSTEMS

260533.23 SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS
260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS
260935 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM
262416 PANELBOARDS
262726 WIRING DEVICES
262816.16 ENCLOSED SWITCHES
265100 INTERIOR LIGHTING
265600 EXTERIOR LIGHTING

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

284600 FIRE DETECTION AND ALARM

DIVISION 31 THRU 33 (NOT USED)

SECTION 013300
ARCHITECT'S SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting RFI's, Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Documents will be provided by Architect for Contractor's use in preparing submittals. See 1.4 below.
- B. All submittals must be in electronic form. Paper copies are not acceptable unless specifically listed. The architect will review, stamp and return an electronic document for the contractor's use. Copies of the reviewed shop drawings shall be provided by the contractor for distribution as required by the Construction Manager.
- C. Each submittal item shall be submitted in its entirety as one complete package including all information required to fully review the item. Material sample, data, warranty and maintenance information, and drawings shall come as one package. Submittals missing required components and / or without product selections identified will be rejected without review.
- D. Compliance Certificate: Refer to the attached Compliance Certificate. Compliance Certificates are to be used by contractors to indicate the products/devices intended for use in this project without the need and time for product data submittals. Contractors shall use Compliance Certificates whenever possible to expedite the work and limit paper work. Items listed on the form must be approved products listed in the specifications. No substitutions allowed. Select one (1) source for each category, sign this sheet, and submit as the contractor's commitment to use products required by the contract documents. No further product data submittals are required for this section. Physical sample, color samples, or layout shop drawings must be submitted where required by the specification. Refer to the attached specification list for sections that are subject to this certificate. **NOTE: Not all specification sections listed below will apply to the project listed above. There might not be specification sections included that are in the**

project listed above, in that case coordinate with architect at post bid interview for submittal requirements.

- E. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- F. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- G. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. RFI's, request for information: Allow 5 working days for initial response for each RFI. Allow additional time if coordination with subsequent RFI is required, or when additional information is need for the response.
 2. Shop drawings, sample, and product data:
 - a. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - b. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - c. Resubmittal Review: Allow 15 days for review of each resubmittal.
 - d. Sequential Review: where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 - e. Submissions that are large or of multiple submissions or requires detailed or lengthy review by the Architect or his consultant may require additional time.
 - f. Submissions for products or material that require a long lead time for delivery shall be noted as such and marked "Top Priority" so the architect may expedite the process. The architect will expedite reviews when the contractor legitimately can't submit within a reasonable time due to construction schedule. Failure to submit in a timely manner or to allow sufficient time for initial review and resubmittal reviews may result in project delays, additional service charges by the architect, or other penalties for the contractor.

- H. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- I. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- J. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.
- K. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form including electronic submittals. Architect will discard submittals received from sources other than the Construction Manager. Architect will return any submittal with a transmittal, which doesn't fully list, and properly identify the enclosed items.
- L. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked " Review or reviewed with comments."
- M. Distribution: Furnish copies of reviewed submittals to the Construction Manager, manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

1.4 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to the Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. The Architect will provide, electronic data files, compatible with AutoCAD for contractor's convenience and use in the preparation of shop drawings. **Refer to Terms and Conditions at the end of this specification.** Requests for electronic data shall be in written form through the architect. Prior to the release of electronic files, the Architect will require a signed waiver of release. Contractors should allow a minimum of 1-week for this process.

PART 2 - RFI'S – REQUEST FOR INFORMATION

- 1. All RFI's shall be submitted to the Architect in electronic form. PDF's and Word files are acceptable.
- 2. PDF RFI forms shall include an editable text area for response, date, and signature.
- 3. RFI's shall be distributed by e-mail. E-mail title shall be specific to job name, and RFI number. This is mandatory for proper tracking.
- 4. Faxed and Hand written RFI's are not acceptable and will be rejected.

PART 3 - PRODUCTS

3.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
 - 1. Submittal Types:
 - a. Shop Drawing
 - b. Product Data
 - c. Sample
 - d. Other
- B. Kingscott Review Stamp Statement: "Reviewed only for the limited purpose of checking for conformance with the design concept expressed in the Contract Documents. Dimensions, quantities, accuracy, assembly methods, installation methods, coordination with other trades and field verification are the responsibility of the contractor."
 - 1. The following Actions will be taken:
 - a. Reviewed with no exceptions
 - b. Reviewed with Exceptions
 - c. Revise and resubmit
 - d. Rejected
- C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. Use the Material Compliance form when permitted and whenever possible to save time and paper work.
 2. If information must be specially prepared for submittal because standard data are not suitable for use, submit as Shop Drawings, not as Product Data.
 3. Mark each copy of each submittal to show which products and options are applicable. Unmarked submittals will be rejected. Failure to mark appropriate products will result in rejection of the submittal.
 4. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Compliance with specified referenced standards.
 - i. Testing by recognized testing agency.
 5. Number of Copies: Submit one electronic copy of Product Data, unless otherwise indicated. Architect will return one electronic copy. See the Construction Manager's submittal requirements for final record and distribution copy requirements.
- D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shop work manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Number of Copies: Submit one opaque (bond) copy, and one electronic copy of each submittal. Architect will return one electronic copy for printing and distribution.

- E. Samples: **Submit Physical Samples** for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available. **Scanned color charts, samples, etc. will be REJECTED. Send physical samples, color charts, etc. as described in each specification section.**
 - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection. **Scanned color charts, samples, etc., will be REJECTED. Send physical samples, color charts, etc. as described in each specification section.**
 - a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.

3.2 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit four copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 4 - EXECUTION

4.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions prior to submission for review. It is the contractor's responsibility to review and identify major discrepancy with the contract documents, and significant missing information. Documents with discrepancies and substantially missing information shall be returned for revisions prior to submission to the Construction Manager.
- B. Mark with approval stamp before submitting to the Construction Manager.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

4.2 CONSTRUCTION MANAGER'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions prior to submission for review. It is the Construction Manager's responsibility to review and identify major discrepancy with the contract documents, and significant missing information. Documents with discrepancies and substantially missing information shall be returned for revisions prior to submission to the Architect.
- B. Mark with approval stamp before submitting to Architect.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

4.3 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's and Construction Managers approval stamp, and have not been fully reviewed and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 1. Reviewed with no exceptions.
 2. Reviewed with exceptions.
 3. Revise and resubmit.
 4. Rejected.

- C. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- D. Incomplete submittals with substantial missing information, will be considered non-responsive, and will be returned without review.
- E. Non-complaint submittals, will be considered non-responsive, and will be returned without review.
- F. Submittals not required by the Contract Documents will not be reviewed and will be discarded.

SUBMITTALS REQUESTED BY SPECIFICATION SECTION						
<i>This is a general guide, but may vary by project.</i>						
Given the age of digital submittal, product information and images, and multiple files can be compiled into one complete product data page. When this complete product data sheet is submitted, it becomes an acceptable option to help limit physical samples and paper.						
SECTION NO.	SECTION TITLE	PRODUCT DATA	SAMPLE	SHOP DRAWINGS	MATERIAL COMPLIANCE	TESTING
033000	CAST-IN-PLACE CONCRETE	X		X		X
042000	UNIT MASONRY/BRICK	X	X (BRICK)			
047200	CAST STONE	X	X			
051200	STRUCTURAL STEEL FRAMING			X		
052100	STEEL JOIST			X		
053100	STEEL DECKING				X	
054000	COLD-FORMED METAL FRAMING			X		
055000	METAL FABRICATIONS			X		
055113	METAL PAN STAIRS			X		
055213	PIPE AND TUBE			X		
061000	ROUGH CARPENTRY				X	
061053	MISCELLANEOUS ROUGH CARPENTRY				X	
061063	EXTERIOR ROUGH CARPENTRY				X	
061600	SHEATHING				X	
061753	SHOP-FABRICATED WOOD TRUSSES			X		
062013	EXTERIOR FINISH CARPENTRY		X		X	
062023	INTERIOR FINISH CARPENTRY		X		X	
071326	SELF-ADHERING SHEET	X			X	
072100	THERMAL INSULATION	X			X	
072119	FOAMED-IN-PLACE INSULATION	X			X	
072500	WEATHER BARRIERS	X			X	
072600	VAPOR RETARDERS	X			X	
073113	ASPHALT SHINGLES		X			

SECTION. NO.	SECTION TITLE	PRODUCT DATA	SAMPLE	SHOP DRAWINGS	MATERIAL COMPLIANCE	TESTING
074113.16	STANDING-SEAM METAL ROOF PANELS		X			
074213.13	FORMED METAL WALL PANELS		X	X		
074213.19	INSULATED METAL WALL PANELS		X	X		
075323	ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING			X		
075423	THERMOPLASTIC POLYOLEFIN (TPO) ROOFING			X		
076200	SHEET METAL FLASHING AND TRIM		X			
077100	ROOF SPECIALTIES	X			X	
077129	MANUFACTURED ROOF EXPANSION JOINTS	X			X	
077200	ROOF ACCESSORIES	X			X	
078413	PENETRATION FIRESTOPPING				X	
078443	JOINT FIRESTOPPING				X	
079200	JOINT SEALANTS	X	X			
079219	ACOUSTICAL JOINT SEALANTS	X	X			
081213	HOLLOW METAL DOORS AND FRAMES			X		
081416	FLUSH WOOD DOORS		X	X		
083113	ACCESS DOORS AND FRAMES				X	
083313	COILING COUNTER DOORS			X		
083323	OVERHEAD COILING DOORS			X		
083513	FOLDING DOORS			X		
083613	SECTIONAL DOORS			X		

SECTION. NO.	SECTION TITLE	PRODUCT DATA	SAMPLE	SHOP DRAWINGS	MATERIAL COMPLIANCE	TESTING
084113	ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS		X	X		
084413	GLAZED ALUMINUM CURTAIN WALLS		X	X		
084523	FIBERGLASS-SANDWICH-PANEL ASSEMBLIES	X			X	
085113	ALUMINUM WINDOWS		X	X		
087100	DOOR HARDWARE			X		
088000	GLAZING	X			X	
088300	MIRRORS				X	
089119	FIXED LOUVERS		X	X		
092116.23	GYPSON BOARD SHAFT WALL ASSEMBLIES				X	
092216	NON-STRUCTURAL METAL FRAMING				X	
092900	GYPSON BOARD				X	
093013	CERAMIC TILE	X			X	
095113	ACOUSTICAL PANEL CEILING				X	
096513	RESILIENT BASE & ACCESSORIES				X	
096516	RESILIENT SHEET VINYL	X				
096519	RESILIENT TILE FLOORING	X				
096566	RESILIENT ATHLETIC FLOORING	X				
096813	TILE CARPET	X				
096816	SHEET CARPET	X				
097200	WALL COVERINGS	X				
098433	SOUND ABSORBING WALL UNITS	X				
098436	SOUND ABSORBING CEILING UNITS	X				
099113	EXTERIOR PAINTING		X			
099123	INTERIOR PAINTING		X			
099600	HIGH PERFORMANCE COATINGS		X			

SECTION. NO.	SECTION TITLE	PRODUCT DATA	SAMPLE	SHOP DRAWINGS	MATERIAL COMPLIANCE	TESTING
101100	VISUAL DISPLAY BOARDS			X	X	
101200	DISPLAY CASES			X	X	
101423	PANEL SIGNAGE		X	X		
102113	TOILET COMPARTMENTS	X		X		
102116	SHOWER AND DRESSING COMPARTMENTS	X		X		
102123	CUBICAL CURTAINS AND TRACK	X			X	
102800	TOILET, BATH, AND LAUNDRY ACCESSORIES (CONTRACTOR TO VERIFY QUANTITIES)				X	
104413	FIRE PROTECTION CABINETS				X	
104416	FIRE EXTINGUISHERS				X	
105113	METAL LOCKERS		X	X		
105613	METAL SHELVING				X	
105626	MOBILE STORAGE SHELVING			X	X	
113100	RESIDENTIAL APPLIANCES				X	
115123	LIBRARY STACK SYSTEMS		X	X		
115213	PROJECTION SCREENS				X	
115313	LABORATORY FUME HOODS		X	X		
116143	STAGE CURTAINS		X	X		
116623	GYMNASIUM EQUIPMENT		X	X		
126600	TELESCOPING STANDS		X	X		
122113	HORIZONTAL BLINDS	X				
122413	VERTICLE BLINDS	X				
122413	ROLLER SHADES (OPERABLE SHOP DRAWINGS)	X		X	X	

SECTION. NO.	SECTION TITLE	PRODUCT DATA	SAMPLE	SHOP DRAWINGS	MATERIAL COMPLIANCE	TESTING
123__	CASEWORK AND COUNTERTOPS		X	X		
124816	ENTRANCE FLOOR GRILLS	X				

Material Compliance Form

Name of Building:

Owner:

Bid Package #:

A/E #:

Cc:

Material Compliance Submittal Section:

This document is to be used by this contractor to indicate the products/devices intended for use in this project without the need for product data submittals. Items listed are approved products in the specifications. No substitutions allowed. Select one (1) source for each category, sign this sheet, and submit as the contractor's commitment to use products required by the contract documents. **No further product data submittals are required for this section. However, physical sample, color samples, or layout shop drawings must be submitted where required by the specification.**

As contractor for work specified under the section named above, I agree to use only the products/devices listed below that were listed in the specification section.

Contractor:

Date:

Print Name: **Filled out by Contractor**

Title:

Signature: _____

Notary:

County:

Date Commission Expires:

Print Name:

Signature: _____

Filled out by Contractor and Notary used from Contractor

Reviewed By: Construction Manager, Inc.

Date:

Print Name: **Filled out by Construction Manager**

Signature: _____

Reviewed By: Kingscott Associates, Inc.

Date:

Print Name:

Signature: _____

Filled out by Architect

List the manufacturer's name and model number(s) for each item being submitted in this division. Provide all relevant information not covered by the model number to show full compliance with each requirement of the specification. This will include but is not limited to color, finish, size, thickness and all other selectable option. Note: Use location for each listed item when several different items in this division are used in specific locations.

Specification Section:

Manufacturer's Name:

Model Number:

096519

Shaw Commercial

Uncommon Ground 6 #0188V (LVT-1)

096519

Shaw Commercial

Skyline #02560 (LVT-2)

095113

Armstrong

#1713 (CP-1)

095113

Armstrong

#3101 (CP-2)

095113

Armstrong

Armstrong Prelude XL (ME-1 grid)

095113

Armstrong

Armstrong Axiom Classic Trim (ME-2 grid and trim)

Material Compliance Form

Name of Building:

Owner:

Bid Package #:

A/E #:

Cc:

Material Compliance Submittal Section:

This document is to be used by this contractor to indicate the products/devices intended for use in this project without the need for product data submittals. Items listed are approved products in the specifications. No substitutions allowed. Select one (1) source for each category, sign this sheet, and submit as the contractor's commitment to use products required by the contract documents. **No further product data submittals are required for this section. However, physical sample, color samples, or layout shop drawings must be submitted where required by the specification.**

As contractor for work specified under the section named above, I agree to use only the products/devices listed below that were listed in the specification section.

Contractor:

Date:

Print Name:

Title:

Signature: _____

Notary:

County:

Date Commission Expires:

Print Name:

Signature: _____

Reviewed By: Construction Manager, Inc.

Date:

Print Name:

Signature: _____

Reviewed By: Kingscott Associates, Inc.

Date:

Print Name:

Signature: _____

List the manufacturer's name and model number(s) below for each item being submitted in this division. Provide all relevant information not covered by the model number to show full compliance with each requirement of the specification. This will include but is not limited to color, finish, size, thickness and all other selectable option. Note: Use location for each listed item when several different products in this division are used in specific locations.

Specification Section:

Manufacturer's Name:

Model Number:

Electronic Media Authorization

Signed waiver required prior to release

Project Name: _____ KAI Project# _____

Name : _____ Company: _____

Address: _____

City, State, Zip: _____

Phone: _____ Email: _____

Autocad file version: _____

Signature: _____ Date: _____

By signing, you are agreeing to the Terms and Conditions on the following page

Documents Requested:	KAI DWG #	Issued Date on DWG
_____	_____	_____
_____	_____	_____
_____	_____	_____

Approved by: _____ Date: _____

Email form to:
vmurad@kingscott.com

TERMS AND CONDITIONS ON DISTRIBUTION AND USE OF ELECTRONIC FILES

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Kingscott's electronic files are compatible with Autocadd. Kingscott makes no representation as to the compatibility of these files with your hardware or your software.

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INDEMNIFICATION

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SECTION 014000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where

indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the

minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

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

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to

Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.

10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings or as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.10 QUALITY CONTROL

- A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

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

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

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner and as follows:

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 017329
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 2 Section "Selective Demolition" for demolition of selected portions of the building.
 - 2. Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

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

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - 1. Primary operational systems and equipment.
 - 2. Air or smoke barriers.
 - 3. Mechanical systems piping and ducts.

4. Control systems.
 5. Communication systems.
 6. Electrical wiring systems.
 7. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.

- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 024119
SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 01 Section "Summary."
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, preconstruction videotapes, and templates.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 Section "Asphalt Shingles" for new roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 024119

SECTION 031000
CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. If differing requirements are identified elsewhere (in these specifications or on drawings or separate instructions), the more stringent requirement shall be met.

1.2 SUMMARY

- A. Section Includes:
 - 1. Form-facing material for cast-in-place concrete.
 - 2. Shoring, bracing, and anchoring.
 - 3. Concrete accessories

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following:
 - 1. Exposed surface form-facing material.
 - 2. Concealed surface form-facing material.
 - 3. Form ties.
 - 4. Form-release agent.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Minutes of preinstallation conference.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
 - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
 - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.2 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
 - 1. Provide continuous, true, and smooth concrete surfaces.
 - 2. Furnish in largest practicable sizes to minimize number of joints.
- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
 - 1. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 RELATED MATERIALS

- A. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
- E. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes
- C. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch. (concealed concrete only)
 - 2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch. (all exposed concrete)
- D. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
 - 1. Provide and secure units to support screed strips.
 - 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
 - 1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
 - 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
 - 1. Determine sizes and locations from trades providing such items.

2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

L. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings.
 - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediate prior to concrete placement.

3.3 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
 2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

SECTION 032000
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. If differing requirements are identified elsewhere (in these specifications or on drawings or separate instructions), the more stringent requirement shall be met.

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel reinforcement bars.
 - 2. Welded-wire reinforcement.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of steel reinforcement.
 - 2. Bar supports.
- B. Shop Drawings: Comply with ACI SP-066:
 - 1. Include placing drawings that detail fabrication, bending, and placement.
 - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
 - 1. Reinforcement to Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M
- B. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Steel Reinforcement:
 - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- B. Headed-Steel Reinforcing Bars: ASTM A970/A970M.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings or as follows whichever is greater.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped per ACI 318.
 - 2. Stagger splices in accordance with ACI 318.
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
 - 4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - 2. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2 inches for plain wire and 8 inches for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 - 4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel-reinforcement placement.
 - 2. Steel-reinforcement mechanical splice couplers.
 - 3. Steel-reinforcement welding.

END OF SECTION 032000

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. If differing requirements are identified elsewhere (in these specifications or on drawings or separate instructions), the more stringent requirement shall be met.

1.3 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, and insulating concrete forms.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
7. Vapor barriers.
8. Liquid floor treatments.
9. Curing materials.
10. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.

5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.7 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 1. Cementitious materials.
 2. Admixtures.
 3. Curing compounds.
 4. Vapor barriers.
 5. Joint-filler strips.
- B. Material Test Reports: For the following, from a qualified testing agency:
 1. Portland cement.
 2. Fly ash.
 3. Slag cement.
 4. Blended hydraulic cement.
 5. Aggregates.
 6. Admixtures:
- C. Certified letter stating that they have done a survey of existing conditions.
- D. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
- E. Preconstruction Test Reports: For each mix design.
- F. Field quality-control reports.
- G. Minutes of preinstallation conference.

1.8 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 1. Include the following information in each test report:

- a. Admixture dosage rates.
- b. Slump.
- c. Air content.
- d. Seven-day compressive strength.
- e. 28-day compressive strength.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.11 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, or
 - 2. Blended Cement: ASTM C595
 - 3. Fly Ash: ASTM C618, Class C or F.
 - 4. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Alkali-Silica Reaction: Comply with one of the following:
 - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
 - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance

with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: as indicated.
 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 FIBER REINFORCEMENT

- A. Synthetic Monofilament Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ABC Polymer Industries, LLC.
 - b. BASF Corporation.
 - c. Euclid Chemical Company (The); an RPM company.
 - d. GCP Applied Technologies Inc.
 - e. Propex Operating Company, LLC.
 - f. Sika Corporation.
- B. Synthetic Fibrillated Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ABC Polymer Industries, LLC.
 - b. BASF Corporation.
 - c. Euclid Chemical Company (The); an RPM company.

- d. GCP Applied Technologies Inc.
 - e. Propex Operating Company, LLC.
 - f. Sika Corporation.
- C. Synthetic Macro-Fiber: Synthetic macro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1 to 2-1/4 inches long.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ABC Polymer Industries, LLC.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. GCP Applied Technologies Inc.
 - d. Propex Operating Company, LLC.
 - e. Sika Corporation.

2.4 VAPOR BARRIER

- A. Sheet Vapor Barrier: ASTM E 1745, Class A, except with maximum perm rating of 0.01 or lower. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Barrier-Bac; Inteplast Group, Ltd.; Seam Tape and VB-350.
 - b. Fortifiber Building Systems Group; Moistop Ultra 15.
 - c. Raven Industries, Inc; VaporBlock VB15.
 - d. Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil).
 - e. W.R. Meadows, Inc; Perminator 15 mil.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
- 1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- C. Curing Paper: Eight-foot-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- D. Water: Potable or complying with ASTM C1602/C1602M.
- E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

- F. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Floor Slab Protective Covering: Eight-feet-wide cellulose fabric.

2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as indicated on drawings.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.

2.8 CONCRETE MIXTURES

- A. As indicated on drawings.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 INSTALLATION OF VAPOR BARRIER

- A. Sheet Vapor Barrier: Place, protect, and repair sheet vapor barrier in accordance with ASTM E1643 and manufacturer's written instructions.
 1. Install vapor barrier with longest dimension parallel with direction of concrete pour.
 2. Face laps away from exposed direction of concrete pour.
 3. Lap vapor barrier over footings and grade beams not less than 6 inches, sealing vapor barrier to concrete.
 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
 5. Terminate vapor barrier at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
 6. Seal penetrations in accordance with vapor barrier manufacturer's instructions.
 7. Protect vapor barrier during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor barrier material, overlapping damages area by 6 inches on all sides, and sealing to vapor barrier.

3.3 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 2. Place joints perpendicular to main reinforcement.

- a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated and as follows:
 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor barrier is complete and that required inspections are completed.
 1. Immediately prior to concrete placement, inspect vapor barrier for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor barrier during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Do not place concrete floors and slabs in a checkerboard sequence.
 - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Level concrete, cut high areas, and fill low areas.
 - 6. Slope surfaces uniformly to drains where required.
 - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 - 8. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

- A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/4 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface.

a. Slabs on Ground:

- 1) Typical floor unless otherwise listed
 - a) SO FF 25/FL 20 with MLFF 17/MLFL 15.
- 2) Thin-set flooring and warehouse floor
 - a) SOI FF 35/FL 25 with MLFF 21/MLFL 13.
- 3) Gymnasium floor, ice or roller rinks, and warehouses with air-pallet use
 - a) SO FF 45/FL 35 with MLFF 30/MLFL 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings or where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases a minimum of 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: to match concrete surface it is placed on at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
 - 1. Cast-in inserts and accessories, as shown on Drawings.
 - 2. Screed, tamp, and trowel finish concrete surfaces.

3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - 1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 - 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply in accordance with manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
 - 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 - 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
 - 3. If forms remain during curing period, moist cure after loosening forms.
 - 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

- a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
- b. Continuous Sprinkling: Maintain concrete surface continuously wet.
- c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
- d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
- e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.

D. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

- 1. Begin curing immediately after finishing concrete.
- 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12-inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
 - b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:
- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
 - 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
 - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
 - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.

- e. Floors to Receive Urethane Flooring:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
 - 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
 - 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

- f. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

- g. Floors to Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.9 TOLERANCES

- A. Conform to ACI 117 (UNO).

3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 2. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

- a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
 1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M:

- a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
 - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests:
 - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

- b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
 - 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Architect.

3.11 PROTECTION

- A. Protect concrete surfaces as follows:
- 1. Protect from petroleum stains.
 - 2. Diaper hydraulic equipment used over concrete surfaces.
 - 3. Prohibit vehicles from interior concrete slabs.
 - 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 - 5. Prohibit placement of steel items on concrete surfaces.
 - 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 - 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 - 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

Kingscott Associates, Inc.
Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

SECTION 061053
MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
1. Framing with dimension lumber.
 2. Wood blocking and nailers.
 3. Interior wood trim.
- B. Related Sections include the following:
1. Division 06 Section "Sheathing."

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NeLMA: Northeastern Lumber Manufacturers' Association.
 2. NLGA: National Lumber Grades Authority.
 3. SPIB: The Southern Pine Inspection Bureau.
 4. WCLIB: West Coast Lumber Inspection Bureau.
 5. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
 2. Power-driven fasteners.
 3. Powder-actuated fasteners.
 4. Expansion anchors.
 5. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3 grade and any of the following species:
 - 1. Mixed southern pine; SPIB.
 - 2. Northern species; NLGA.
 - 3. Eastern softwoods; NeLMA.
 - 4. Western woods; WCLIB or WWPA.
- C. Other Framing: Construction or No. 2 grade and any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Southern pine; SPIB.
 - 3. Douglas fir-larch; WCLIB or WWPA.

4. Douglas fir-south; WWPA.
5. Hem-fir; WCLIB or WWPA.
6. Douglas fir-larch (north); NLGA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber with 19 percent maximum moisture content of any species.
- C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 INTERIOR WOOD TRIM

- A. General: Provide kiln-dried finished (surfaced) material without finger-jointing, unless otherwise indicated.
- B. Softwood Lumber Trim for Transparent (Painted) Finish: Provide one of the following species and grade:
 1. Grade C Select eastern white pine; NeLMA or NLGA.
 2. Grade C Select (Choice) Idaho white, lodgepole, ponderosa, or sugar pine; NLGA or WWPA.
- C. Hardwood Lumber Trim for Transparent (Stain or Clear) Finish: Clear red oak, selected for compatible grain and color.
- D. Moldings: Made to patterns included in WMMPA WM 7 and graded according to WMMPA WM 4.

2.6 SHELVING AND CLOTHES RODS

- A. Shelving: Made from the following material, 3/4-inch thick.
 1. Particleboard with radiused and filled front edge.
- B. Shelf Brackets: Prime-painted formed steel with provision to support clothes rod where rod is indicated.

- C. Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried hardwood rods.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M, or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 .
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A ; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 .

2.8 METAL FRAMING ANCHORS

- A. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locatenailers, blocking, and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
 - 2. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.
 - 1. Match color and grain pattern across joints.
 - 2. Install trim after gypsum board joint-finishing operations are completed.
 - 3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads and fill holes.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600
SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Wall sheathing.
2. Building wrap.
3. Flexible flashing at openings in sheathing.

- B. Related Sections include the following:

1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
- B. Oriented Strand Board: DOC PS 2.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA C9.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Not less than 1/2 inch, unless noted otherwise.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M, or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

2.5 WEATHER-RESISTANT SHEATHING PAPER

- A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Water-Vapor Permeance: Not less than 535 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).
 - 2. Allowable UV Exposure Time: Not less than three months.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.6 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.025 inch.
- C. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
 - 4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
 - 5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
 - 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
 - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."

- D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Space panels 1/8 inch apart at edges and ends.

3.3 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap, unless otherwise indicated.
- B. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.4 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches , except that at flashing flanges of other construction, laps need not exceed flange width.

3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

SECTION 072100
THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
1. Concealed building insulation.
 2. Vapor retarders.
 3. Sound attenuation insulation.
- B. Related Sections include the following:
1. Division 06 Section "Sheathing" for foam-plastic board sheathing over wood framing.
 2. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm air velocity.
 2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation

with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - 1. Manufacturers:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv Building Products Division.
 - 2. Type V, 3.00 lb/cu. ft. .

2.3 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation.
 - 2. Guardian Fiberglass, Inc.
 - 3. Johns Manville.
 - 4. Knauf Fiber Glass.
 - 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm .
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.5 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
- B. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF UNDER-SLAB INSULATION

- A. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- B. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 - 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches , support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 6. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
- D. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
 - 1. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
 - 2. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

3.6 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.7 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 078413
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
 - 1. Division 22 and 23 Sections specifying duct and piping penetrations.
 - 2. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
 - 1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers and smoke barriers.
 - 2. Fire-resistance-rated horizontal assemblies including floors and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

- a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.
- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1. A/D Fire Protection Systems Inc.
 - 2. Grace, W. R. & Co. - Conn.
 - 3. Hilti, Inc.
 - 4. Johns Manville.
 - 5. 3M; Fire Protection Products Division.
 - 6. Tremco; Sealant/Weatherproofing Division.
 - 7. USG Corporation.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.5 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

Kingscott Associates, Inc.
Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

SECTION 078446
FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Joints in or between fire-resistance-rated constructions.
- 2. Joints in smoke barriers.

B. Related Sections:

- 1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

- 1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. The firm should be approved by FMG according to FMG 4991, "Approval of Firestop Contractors". Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. **Source Limitations:** Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.
- C. **Fire-Test-Response Characteristics:** Fire-resistive joint systems shall comply with the following requirements:
 - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. **Environmental Limitations:** Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. **Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.**

1.7 COORDINATION

- A. **Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.**
- B. **Coordinate sizing of joints to accommodate fire-resistive joint systems.**

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

- A. **Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.**
- B. **Joints in or between Fire-Resistance-Rated Construction:** Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace Construction Products.
 - b. Hilti, Inc.
 - c. Johns Manville.
 - d. 3M Fire Protection Products.
 - e. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - f. USG Corporation.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch of water for both ambient and elevated temperatures.
 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grace Construction Products.
 - b. Hilti, Inc.
 - c. Johns Manville.
 - d. 3M Fire Protection Products.
 - e. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - f. USG Corporation.
- D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.5 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Wall-to-Wall, Fire-Resistive Joint Systems:
 - 1. Assembly Rating: 1 hour and 2 hours.
 - 2. Nominal Joint Width: As indicated.
 - 3. Movement Capabilities: Class I.
 - 4. L-Rating: As required by 2015 Michigan Building Code.
- B. Head-of-Wall, Fire-Resistive Joint Systems:
 - 1. Assembly Rating: 1 hour and 2 hours.
 - 2. Nominal Joint Width: 2" or less at steel deck.
 - 3. Movement Capabilities: Class I.
 - 4. L-Rating: As required by 2015 Michigan Building Code.
- C. Perimeter Fire-Resistive Joint Systems:
 - 1. Integrity Rating: 1 hour and 2 hours.
 - 2. Insulation Rating: 1 hour.
 - 3. Linear Opening Width: As indicated.
 - 4. Movement Capabilities: Class I.
 - 5. L-Rating: As required by 2015 Michigan Building Code.

END OF SECTION 078446

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes joint sealants for the following applications:

1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:

- a. Joints between different materials.
- b. Perimeter joints between different materials and frames of doors, windows, and louvers.
- c. Control and expansion joints in ceilings and other overhead surfaces.
- d. Other joints as indicated.

2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:

- a. Control and expansion joints on exposed interior surfaces of exterior walls.
- b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
- c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- d. Other joints as indicated.

- B. Related Sections include the following:

1. Division 08 Section "Glazing" for glazing sealants.
2. Division 09 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
3. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Twenty years from date of Substantial Completion.

- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Multicomponent Nonsag Urethane Sealant **ES-1**:
 - 1. Available Products:

- a. Pecora Corporation; Dynatrol II.
 - b. Tremco; Dymeric 511.
 - c. Tremco; Vulkem 922.
- 2. Type and Grade: M (multicomponent) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick and wood.

2.4 LATEX JOINT SEALANTS

- A. Latex Sealant **LS-1**: Comply with ASTM C 834, Type P, Grade NF.
- B. Available Products:
 - 1. Bostik Findley; Chem-Calk 600.
 - 2. Pecora Corporation; AC-20+.
 - 3. Sonneborn, Division of ChemRex Inc.; Sonolac.
 - 4. Tremco; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints **ACS-1**: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
 - 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 2. Available Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Concealed Joints **ACS-2**: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
 - 1. Available Products:
 - a. Pecora Corporation; BA-98.
 - b. Tremco; Tremco Acoustical Sealant.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, U.N.O.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - 6. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 081113
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Standard hollow metal doors and frames.
- 2. Standard hollow borrowed light frames.

B. Related Sections:

- 1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
- 2. Division 09 Section "Interior Painting" for field painting hollow metal doors and frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.4 SUBMITTALS

- A. Material Compliance Certificate: Submit completed material compliance certificate as described in Specification Section 013300 – Architect's Submittal Procedures.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252.

1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.
- E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door Products; an Assa Abloy Group company.
2. Curries Company; an Assa Abloy Group company.
3. Pioneer Industries, Inc.
4. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 4. Top and Bottom Edges: Closed with flush 0.042-inch- thick, end closures or channels of same material as face sheets.
 5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet with metallic-coated sheet at all toilet rooms, locker rooms, janitor closets and other wet locations.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
 - 4. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.
 - 5. Frames for Wood Doors: 0.053-inch- thick steel sheet.
 - 6. Frames for Borrowed Lights: 0.053-inch- thick steel sheet.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated. Provide fixed frame moldings and stops on secure side of interior doors and frames.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 - 1. Glazed Lites: Factory cut openings in doors.
 - 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - b. Compression Type: Not less than two anchors in each jamb.

- c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 - 6. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.

- b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
- a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
6. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
- a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.

- d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
- 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Factory finishing flush wood doors.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of mortises and holes for hardware.
2. Dimensions and locations of cutouts.
3. Doors to be factory finished and finish requirements.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Masonite Architectural.
 - 2. Oshkosh Door Company.
 - 3. VT Industries, Inc.
- B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWMAC's, and WI's "Architectural Woodwork Standards."
 - 1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- C. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
 - 2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, exits, and where indicated.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
 - 3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- F. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-1, made with binder containing no urea-formaldehyde.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.

- b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch midrail blocking, in doors indicated to have exit devices.
3. Provide doors with structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

G. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.

H. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - d. 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Match Existing.
2. Species: Match existing.
3. Cut: Match existing.
4. Match between Veneer Leaves: Match Existing.
5. Assembly of Veneer Leaves on Door Faces: Match Existing.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
10. Core: Particleboard.

11. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
12. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Flush rectangular beads.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.

- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: WDMA TR-6 catalyzed polyurethane.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 5. Sheen: Satin Group SS2.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Access doors and frames for walls and ceilings.
- B. Related Sections include the following:
 - 1. Division 09 Section "Acoustical Tile Ceilings" for suspended acoustical tile ceilings.
 - 2. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 for vertical access doors and frames.

- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Sheet: electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
 - 3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 STAINLESS-STEEL MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316. Remove tool and die marks and stretch lines or blend into finish.
 - 1. Finish: Manufacturer's standard.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Acudor Products, Inc.
 - 2. Babcock-Davis; A Cierra Products Co.
 - 3. J. L. Industries, Inc.
 - 4. Larsen's Manufacturing Company.
 - 5. Milcor Inc.

- B. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Fabricated from sheet material as noted for non-fire rated access doors and frames.
 - 1. Locations: As noted for non-fire rated doors and frames.
 - 2. Fire-Resistance Rating: Not less than that indicated on code composite plan, ceiling notes, and partition types.
 - 3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
 - 4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
 - 5. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
 - 6. Hinges: Continuous piano.
 - 7. Automatic Closer: Spring type.
 - 8. Latch: Self-latching device operated by hex head wrench with interior release.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: As indicated.
 - 2. For trimless frames with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
 - 3. For trimless frames with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 4. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 5. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.

- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 084113
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior and interior storefront framing.
 - 2. Storefront framing for punched openings.
 - 3. Exterior and interior manual-swing entrance doors and door-frame units.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
 - D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
 - E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- C. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- D. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.03 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..
 2. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 0.4 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- E. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- F. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.

2.2 MANUFACTURERS

- A. Manufactures aluminum storefront and frames: Subject to compliance with requirements provide storefront framing and frames as follows:
 - 1. Basis of Design – Kawneer Trifab 451UT or architects pre-approved equal.
 - 2. Tubelite
 - 3. EFCO.
 - 4. Cross.
 - 5. Special-Lite

- B. Manufactures aluminum entry doors: Subject to compliance with requirements provide entry doors as follows:
 - 1. Basis of Design – Special-Lite SL-16 door or Architect’s pre-approved equal.
 - 2. Kawneer
 - 3. Tubelite
 - 4. EFCO
 - 5. Cross.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Center
 - 4. Finish: Dark Bronze Anodized
 - 5. Fabrication Method: Field-fabricated stick system.
 - 6. Frame Size: 2” wide x 4-1/2” deep.

- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

- D. Materials:
 - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.

 - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation

and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

- a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard flush and glazed entrance doors for manual-swing operation.
 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 2. Core: Poured-in-place polyurethane foam.
 3. Door Design: As indicated on drawings. Changes to indicated door styles shown will not be allowed.
 4. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
- D. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.
 1. Color: Match structural sealant.

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from interior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using manufacturer's standard system.
- F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.

2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

- A. General:
 1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide twelve months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

SECTION 085200
WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite (Fibrex) wood windows.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

- a. Window: **10** years from date of Substantial Completion.
- b. Glazing Units: **20** years from date of Substantial Completion.
- c. Vinyl Cladding: Lifetime warranty.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: **LC**.
 - 2. Minimum Performance Grade: **50**.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40.

2.2 WOOD WINDOWS

- A. Composite (Fibrex) Wood Windows:
 - 1. Basis of Design: **A-Series Composite (Fibrex) Wood by Anderson Windows and Doors**
- B. Operating Types: Casement and Fixed.
- C. Frames and Sashes: Fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide; water-repellent preservative treated.
 - 1. Exterior Finish: Composite (Fibrex) wood.
 - a. Color: **As selected by Owner from manufacturer's full range.**
 - 2. Interior Finish: Manufacturer's standard stain-and-varnish finish as selected by Owner.
- D. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
 - 1. Kind: Fully tempered where required by Code for safety.
- E. Insulating-Glass Units: ASTM E2190.
 - 1. Glass: ASTM C1036, Type 1, Class 1, q3.
 - a. Tint: Clear.
 - b. Kind: Fully tempered where required by Code.
 - 2. Lites: Two.

3. Filling: Fill space between glass lites with argon.
 4. Low-E Coating: Pyrolytic on second surface.
- F. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- G. Hardware, General: Provide manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
1. Exposed Hardware Color and Finish: **As selected by Owner from manufacturer's full range.**
- H. Projected Window Hardware:
1. Manufacturer's standard for casement window units.
- I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.3 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
1. Type and Location: Full, inside for project-out. **NOTE: RESCUE/EGRESS WINDOWS ARE NOT TO HAVE SCREENS.**
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
1. Finish for Exterior Screens: Manufacturer's standard finish.
- C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
1. Mesh Color: Manufacturer's standard.

2.4 FABRICATION

- A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze wood windows in the factory.

- C. Weather strip each operable sash to provide weathertight installation.
- D. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085200

SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware.
2. Electronic access control system components.
3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section “Alternates” for alternates affecting this section.
2. Division 06 Section “Rough Carpentry”
3. Division 06 Section "Finish Carpentry”
4. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. “Metal Doors and Frames”
 - b. “Flush Wood Doors”
 - c. “Stile and Rail Wood Doors”
 - d. “Interior Aluminum Doors and Frames”
 - e. "Aluminum-Framed Entrances and Storefronts"
6. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
7. Division 26 “Electrical” sections for connections to electrical power system and for low-voltage wiring.
8. Division 28 “Electronic Safety and Security” sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL, LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies

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3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.
 - b. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - c. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:

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- 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
- a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
- a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.

- b. Catalog pages for each product.
- c. Final approved hardware schedule edited to reflect conditions as installed.
- d. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- e. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. fire door assemblies, in compliance with NFPA 80.
 - b. required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.

- b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
 2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
 3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
 4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in “REFERENCES” article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 2. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 3 years
 - b) Schlage ND Series: 10 years
 - 2) Exit Devices
 - a) Von Duprin: 3 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years

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- b) LCN 1460 Series: 30 years
- 4) Automatic Operators
 - a) LCN: 2 years
- b. Electrical Warranty
 - 1) Locks
 - a) Schlage: 1 year
 - 2) Exit Devices
 - a) Von Duprin: 1 year

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: “No Substitute.”
 - 1. Where “No Substitute” is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of alternate manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category are only to be considered by official substitution request in accordance in section 01 25 00.
- C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect’s approval.

2.02 MATERIALS

- A. Fabrication

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1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.
1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
 2. Use materials which match materials of adjacent modified areas.
 3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- D. Cable and Connectors:
1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

- A. Manufacturers and Products:
1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
 2. Acceptable Manufacturers and Products:
 - a. Hager BB1191/1279 series
 - b. McKinney TB series
- B. Requirements:

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1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
9. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
10. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Select
 - b. Pemko

B. Requirements:

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1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. Securitron CEPT-10

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood

B. Requirements:

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1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.08 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
 - a. Sargent 8200 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.

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4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: 03A.

2.09 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series
2. Acceptable Manufacturers and Products:
 - a. Sargent 11-Line series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: TLR.

2.10 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:

- a. Sargent 19-43-GL-80 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer’s approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.11 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

- a. Von Duprin 6000 series

2. Acceptable Manufacturers and Products:

- a. Folger Adam 300 series
- b. HES 1006 and 9500 series

B. Requirements:

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1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.12 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 series
2. Acceptable Manufacturers and Products:
 - a. Securitron BPS series
 - b. Security Door Controls 600 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.13 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Best

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2. Acceptable Manufacturers and Products:

- a. No Substitute

B. Requirements:

1. Provide interchangeable cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision.

2.14 KEYING

A. Scheduled System:

1. Existing factory registered system:

- a. Provide cylinders/cores 0-Bitted for Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28.

B. Requirements:

1. Permanent Keying: Provided by Owner.

2.15 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Provide by Owner

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

- a. LCN 4040XP series

2. Acceptable Manufacturers and Products:

- a. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.

3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. Through-bolt all wood door closers.

2.17 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 1460 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action cast iron cylinder.
3. Closer Body: 1-1/4-inch (32 mm) diameter, with 5/8-inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
9. Through-bolt all wood door closers.

2.18 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4600 series
2. Acceptable Manufacturers and Products:
 - a. Besam Power Swing

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide hard-wired actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.19 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood

B. Requirements:

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1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.20 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.21 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson
2. Acceptable Manufacturers:
 - a. Sargent
 - b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.22 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

2. Acceptable Manufacturers:

- a. Burns
- b. Rockwood

B. Provide door stops at each door leaf:

- 1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
- 2. Where a wall stop cannot be used, provide overhead stops, unless otherwise indicated in sets.

2.23 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Zero International

2. Acceptable Manufacturers:

- a. National Guard
- b. Reese
- c. Pemko

B. Requirements:

- 1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
- 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
- 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
- 4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.24 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives

2. Acceptable Manufacturers:

- a. Burns
- b. Rockwood

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.25 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. GE-Interlogix

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.26 FINISHES

- A. Finish: Generally, Satin Chromium, BHMA 626/652 (US26D). Provide finish for each item as indicated in the sets.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. 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 preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field modify and prepare existing doors and frames for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.
 - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

- I. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY 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. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- J. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- K. 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.
- L. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. 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.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. 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.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

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








3.06 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier’s responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Hardware Group No. 01

For use on Door #(s):
120B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16" F		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA		695	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE






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Hardware Group No. 02

For use on Door #(s):

103

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
2	EA	PUSH PLATE	8200 6" X 16"		630	IVE
2	EA	PULL PLATE	8303 10" 4" X 16" F		630	IVE
2	EA	SURFACE CLOSER	1461 SHCUSH TBSRT		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS REMOVE KICK-DOWN HOLDERS		630	IVE

NOTES:






1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS.

Hardware Group No. 03

For use on Door #(s):

106A 106B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
2	EA	PUSH PLATE	8200 6" X 16"		630	IVE
2	EA	PULL PLATE	8303 10" 4" X 16" F		630	IVE
2	EA	SURFACE CLOSER	1461 HCUSH TBSRT		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS REMOVE KICK-DOWN HOLDERS REMOVE SURFACE BOLTS		630	IVE

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS.







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Hardware Group No. 04

For use on Door #(s):

118

Each to have:





QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	CORRIDOR W/DEADBOLT & OUTSIDE INDICATOR	LV9456BDC 03B 09-544 OS-OCC		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	4040XP RW/PA TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER

Hardware Group No. 05

For use on Door #(s):

116

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	VANDL CLASSROOM LOCK	ND94BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	WALL STOP	WS406/407CVX		630	IVE
3	EA	SILENCER	SR64		GRY	IVE







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Hardware Group No. 06

For use on Door #(s):

111 113

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
1	EA	VANDL CLASSROOM LOCK	ND94BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	1461 RW/PA TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S REMOVE KICK-DOWN HOLDER		BK	ZER

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.

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Hardware Group No. 07

For use on Door #(s):

109

Each to have:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING FRAME PREPS	652	IVE
1	EA	AUTO FLUSH BOLT	FB31P/FB41P (AS REQ'D)	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL CLASSROOM LOCK	ND94BDC TLR	626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER		BES
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)	689	IVE
2	EA	SURFACE CLOSER	4040XP EDA TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S	BK	ZER
1	EA	ASTRAGAL	383AA	AA	ZER

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS PER NFPA 80.











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Hardware Group No. 08

For use on Door #(s):

107

Each to have:



QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		652	IVE
1	EA	CONST LATCHING BOLT	FB51P/FB61P (AS REQ'D)		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	VANDL CLASSROOM LOCK	ND94BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)		689	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH TBSRT		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	ASTRAGAL	383AA		AA	ZER

Hardware Group No. 09

For use on Door #(s):

125B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
1	EA	VANDL CLASSROOM LOCK	ND94BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS.







Lansing School District – Newcomer Center Remodeling

Hardware Group No. 10

For use on Door #(s):

108 115 121A 122

Each to have:







QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	4040XP RW/PA TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER

Hardware Group No. 11

For use on Door #(s):

127A 127B 127C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	1461 RW/PA TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER

REMOVE KICK-DOWN HOLDER

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.






Lansing School District – Newcomer Center Remodeling

Hardware Group No. 12

For use on Door #(s):

105

Each to have:






QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	4040XP SCUSH TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER

Hardware Group No. 13

For use on Door #(s):

112

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP		652	IVE
			- CONFIRM HINGE REQ. TO MATCH EXISTING FRAME PREPS			
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	1461 SCUSH TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER
			REMOVE KICK-DOWN HOLDER			

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.





Lansing School District – Newcomer Center Remodeling

Hardware Group No. 14

For use on Door #(s):

114A 114B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING FRAME PREPS		652	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	1461 CUSH TBSRT		689	LCN
1	EA	GASKETING	488S REMOVE KICK-DOWN HOLDER		BK	ZER

NOTES:










1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.

Hardware Group No. 15

For use on Door #(s):

104

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
2	EA	MANUAL FLUSH BOLT	FB358/FB458 (AS REQ'D)		626	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)		689	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	GASKETING	488S		BK	ZER
1	EA	ASTRAGAL	383AA		AA	ZER










Lansing School District – Newcomer Center Remodeling

Hardware Group No. 16

For use on Door #(s):

110A 110B 114C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING FRAME PREPS		652	IVE
2	EA	MANUAL FLUSH BOLT	FB358/FB458 (AS REQ'D)		626	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	VANDL STOREROOM LOCK	ND96BDC TLR		626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB (AS REQ'D)		689	IVE
2	EA	SURFACE CLOSER	1461 CUSH TBSRT		689	LCN
1	EA	GASKETING	488S		BK	ZER
1	EA	ASTRAGAL	383AA		AA	ZER

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS PER NFPA 80.

Lansing School District – Newcomer Center Remodeling

Hardware Group No. 17

For use on Door #(s):

125A

Each to have:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS	652	IVE
1	EA	INSTITUTION LOCK	ND82BDC TLR	626	SCH
2	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER		BES
1	EA	SURFACE CLOSER	1461 RW/PA TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S REMOVE KICK-DOWN HOLDER	BK	ZER

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.

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Hardware Group No. 18

For use on Door #(s):

124A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	POWER TRANSFER	EPT10 CON		⚡ 689	VON
1	EA	VANDL EU STOREROOM	ND96BDCEU TLR RX CON		⚡ 626	SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	ELECTRIC STRIKE	6211 FSE CON		⚡ 630	VON
1	EA	OH STOP	100S		630	GLY
1	EA	SURF. AUTO OPERATOR	4631		⚡ 689	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818T		⚡ 630	LCN
2	EA	SURFACE MOUNT BOX	8310-819S			LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488S		BK	ZER
1	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)		⚡	SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY		⚡	SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM ELECTRIC STRIKE TO POWER SUPPLY		⚡	SCH
1	EA	INTERCOM SYSTEM	PROVIDED BY ACCESS CONTROL CONTRACTOR		⚡	
1	EA	CARD READER	PROVIDED BY ACCESS CONTROL CONTRACTOR		⚡	
1	EA	DOOR CONTACT	1076D-G		⚡ GRY	SEN
2	EA	DESK MOUNT BUTTON	PROVIDED BY ACCESS CONTROL CONTRACTOR		⚡	
1	EA	POWER SUPPLY	PS902 900-4RL - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER		⚡	VON
		WIRING DIAGRAMS	ELEVATION & POINT-TO-POINT DIAGRAMS			VON

Lansing School District – Newcomer Center Remodeling

NOTES:

- 1) POWER SUPPLY SHARED WITH DOOR 124B.
- 2) RELATED TRADES TO REFER TO WIRING DIAGRAM TO ACCOUNT FOR CONDUCTOR COUNTS, WIRE GAUGE, AND ROUGH-IN LOCATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR NORMALLY CLOSED AND LOCKED. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING DESK MOUNT BUTTON LOCATED AT RECEPTION DESK WILL MOMENTARILY UNLOCK THE ELECTRIFIED TRIM ALLOWING ACCESS AND MOMENTARILY ENABLE THE EXTERIOR ACTUATOR BUTTON. PUSHING THE ENABLED EXTERIOR ACTUATOR BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND CAUSE THE AUTOMATIC OPERATOR TO MOMENTARILY OPEN THE DOOR. THE INTERIOR ACTUATOR BUTTON TO BE ENABLED AT ALL TIMES. PUSHING THE INTERIOR ACTUATOR BUTTON WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE AND CAUSE THE AUTOMATIC OPERATOR TO MOMENTARILY OPEN THE DOOR. THE REQUEST TO EXIT FEATURE OF THE LOCK TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACT DURING VALID EGRESS. DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.







Lansing School District – Newcomer Center Remodeling

Hardware Group No. 19

For use on Door #(s):

124B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		652	IVE
1	EA	INSTITUTION LOCK	ND82BDC TLR		626	SCH
2	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	WIRE HARNESS	2004M	⚡		HES
1	EA	SMART PAC III	2005M3	⚡		HES
1	EA	ELECTRIC STRIKE	8300C	⚡	630	HES
1	EA	SURFACE CLOSER	1461 RW/PA TBSRT		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	GASKETING	488S		BK	ZER
2	EA	CARD READER	PROVIDED BY ACCESS CONTROL CONTRACTOR	⚡		
1	EA	DOOR CONTACT	1076D-G	⚡	GRY	SEN
1	EA	PUSH TO ENTER BUTTON	PROVIDED BY ACCESS CONTROL CONTRACTOR	⚡		
2	EA	DESK MOUNT BUTTON	PROVIDED BY ACCESS CONTROL CONTRACTOR	⚡		
		WIRING DIAGRAMS	ELEVATION & POINT-TO-POINT DIAGRAMS			VON

Lansing School District – Newcomer Center Remodeling

NOTES:

- 1) POWER SUPPLY LISTED WITH DOOR 124A.
- 2) RELATED TRADES TO REFER TO WIRING DIAGRAM TO ACCOUNT FOR CONDUCTOR COUNTS, WIRE GAUGE, AND ROUGH-IN LOCATIONS.
- 3) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

UNLOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED AND PUSH TO ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE ENABLED VIA ACCESS CONTROL SYSTEM. PRESSING PUSH TO ENTER BUTTON ON SCHOOL CORRIDOR SIDE WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM SCHOOL CORRIDOR INTO OFFICE. OFFICE SIDE ALWAYS LOCKED PREVENTING FREE PASSAGE FROM OFFICE INTO THE SCHOOL. PRESENTING A VALID CREDENTIAL TO THE READER ON SCHOOL OFFICE SIDE, OR PRESSING DESK MOUNT BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS FROM OFFICE INTO SCHOOL.

LOCKED HOURS: DOOR NORMALLY CLOSED AND LOCKED AND PUSH TO ENTER BUTTON ON SCHOOL CORRIDOR SIDE SHALL BE DISABLED VIA ACCESS CONTROL SYSTEM, THUS LOCKED IN BOTH DIRECTIONS. PRESENTING A VALID CREDENTIAL TO THE READER ON EITHER SIDE OR PRESSING DESK MOUNT BUTTON LOCATED AT RECEPTION DESK, WILL MOMENTARILY UNLOCK THE ELECTRIC STRIKE ALLOWING ACCESS.

PRESENTING A VALID CREDENTIAL TO THE READER EITHER READER TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACT DURING VALID /INGRESS/EGRESS. DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS).

Lansing School District – Newcomer Center Remodeling

Hardware Group No. 20

For use on Door #(s):

100B

Each to have:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS	652	IVE
1	EA	FIRE EXIT HARDWARE	9827-DT-F-LBR-499F	626	VON
1	EA	FIRE EXIT HARDWARE	9827-NL-F-LBR-499F	626	VON
1	EA	SFIC RIM CYLINDER	1E72 (LESS CORE)	626	BES
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER		BES
2	EA	SURFACE CLOSER	1461 EDA TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	488S	BK	ZER
1	EA	MEETING STILE	8217S	BK	ZER
			REMOVE KICK-DOWN HOLDERS		

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS PER NFPA 80.

Lansing School District – Newcomer Center Remodeling

Hardware Group No. 21

For use on Door #(s):

100C 123B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY TWP CON		313AN	IVE
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-35A-NL-OP-388-CON		626	VON
1	EA	SFIC RIM CYLINDER	1E72 (LESS CORE)		626	BES
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	DOOR PULL	VR914 NL		630	IVE
1	EA	SURF. AUTO OPERATOR	4642		695	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-853T		630	LCN
2	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)			SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY			SCH
1	EA	CARD READER	PROVIDED BY ACCESS CONTROL CONTRACTOR			
1	EA	DOOR CONTACT WIRING DIAGRAMS	1076D-G ELEVATION & POINT-TO-POINT DIAGRAMS		GRY	SEN VON

Lansing School District – Newcomer Center Remodeling

NOTES:

- 1) POWER SUPPLY FOR DOOR 100C LISTED WITH DOOR 100A.
- 2) POWER SUPPLY FOR DOOR 123B LISTED WITH DOOR 123A.
- 3) RELATED TRADES TO REFER TO WIRING DIAGRAM TO ACCOUNT FOR CONDUCTOR COUNTS, WIRE GAUGE, AND ROUGH-IN LOCATIONS.
- 4) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE DOOR. THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICE TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACT DURING VALID EGRESS. DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG. DOOR TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

Lansing School District – Newcomer Center Remodeling

Hardware Group No. 22

For use on Door #(s):

123A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY TWP CON		313AN	IVE
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-35A-NL-OP-388-CON		626	VON
1	EA	SFIC RIM CYLINDER	1E72 (LESS CORE)		626	BES
1	EA	SFIC CONST CORE	80-035 (AS REQ'D)			SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	DOOR PULL	VR914 NL		630	IVE
1	EA	SURF. AUTO OPERATOR	4642		695	LCN
1	EA	WEATHER RING	8310-801			LCN
2	EA	ACTUATOR, WALL MOUNT	8310-853T		630	LCN
2	EA	SURFACE MOUNT BOX	8310-867S			LCN
1	EA	WALL STOP	WS406/407CVX		630	IVE
1	EA	DOOR SWEEP	8192D		D	ZER
1	EA	THRESHOLD	655A		A	ZER
1	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)			SCH
1	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY			SCH
1	EA	INTERCOM SYSTEM	PROVIDED BY ACCESS CONTROL CONTRACTOR			
1	EA	CARD READER	PROVIDED BY ACCESS CONTROL CONTRACTOR			
1	EA	DOOR CONTACT	1076D-G		GRY	SEN
1	EA	POWER SUPPLY	PS904 900-4RL - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER			VON
		WIRING DIAGRAMS	ELEVATION & POINT-TO-POINT DIAGRAMS			VON

Lansing School District – Newcomer Center Remodeling

NOTES:

- 1) POWER SUPPLY SHARED WITH DOOR 123B.
- 2) RELATED TRADES TO REFER TO WIRING DIAGRAM TO ACCOUNT FOR CONDUCTOR COUNTS, WIRE GAUGE, AND ROUGH-IN LOCATIONS.
- 3) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER OR INTERCOM SYSTEM WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF. THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICE TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACT DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

Lansing School District – Newcomer Center Remodeling

Hardware Group No. 23

For use on Door #(s):

100A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY EPT		313AN	IVE
2	EA	POWER TRANSFER	EPT10 CON		⚡ 695	VON
1	EA	MULLION	FIXED MULLION			
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-35A-NL-OP-388-CON - RHRA		⚡ 626	VON
1	EA	ELEC PANIC HARDWARE	RX-35A-EO-CON		⚡ 626	VON
1	EA	SFIC RIM CYLINDER	1E72 (LESS CORE)		626	BES
1	EA	SFIC CONST CORE	80-035 (AS REQ'D)			SCH
1	EA	SFIC PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	DOOR PULL	VR914 DT		630	IVE
1	EA	DOOR PULL	VR914 NL		630	IVE
2	EA	OH STOP	100S		695	GLY
1	EA	SURFACE CLOSER	4040XP EDA		695	LCN
1	EA	SURF. AUTO OPERATOR	4642		⚡ 695	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA		695	LCN
1	EA	BLADE STOP SPACER	4040XP-61		695	LCN
1	EA	WEATHER RING	8310-801			LCN
2	EA	ACTUATOR, WALL MOUNT	8310-853T		⚡ 630	LCN
2	EA	SURFACE MOUNT BOX	8310-867S			LCN
2	EA	DOOR SWEEP	8192D		D	ZER
1	EA	THRESHOLD	655A		A	ZER
2	EA	WIRE HARNESS	CON-XX/XXP (AS REQ'D) - ELECTRIFIED HARDWARE TO POWER TRANSFER (EVALUATE CONDITIONS AND MODIFY WIRE LENGTH AS REQ'D)		⚡	SCH
2	EA	WIRE HARNESS	CON-192P - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY		⚡	SCH
1	EA	CARD READER	PROVIDED BY ACCESS CONTROL CONTRACTOR		⚡	
2	EA	DOOR CONTACT	1076D-G		⚡ GRY	SEN
1	EA	POWER SUPPLY	PS904 900-4RL		⚡	VON
		WIRING DIAGRAMS	ELEVATION & POINT-TO-POINT DIAGRAMS			VON

Lansing School District – Newcomer Center Remodeling

NOTES:

- 1) POWER SUPPLY SHARED WITH DOOR 100C.
- 2) RELATED TRADES TO REFER TO WIRING DIAGRAM TO ACCOUNT FOR CONDUCTOR COUNTS, WIRE GAUGE, AND ROUGH-IN LOCATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.










DOORS NORMALLY CLOSED AND LOCKED VIA ACCESS CONTROL SYSTEM. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH (ALLOWING ACCESS) AND ACTIVATE EXTERIOR AUTO OPERATOR ACTUATOR. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF. PUSH INTERIOR ACTUATOR AT ANY TIME WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE LEAF. THE REQUEST TO EXIT FEATURE (RX) OF THE DEVICE TO SHUNT THE ALARM OUTPUT OF THE DOOR CONTACT DURING VALID EGRESS. DOOR CONTACTS MONITOR WHETHER THE DOORS ARE OPENED, CLOSED OR HELD OPEN TOO LONG. DOORS TO REMAIN LOCKED UPON LOSS OF POWER OR ACTIVATION OF LOCKDOWN SYSTEM (PROVIDED BY OTHERS). FREE EGRESS AT ALL TIMES.

Hardware Group No. 24

For use on Door #(s):

106D

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	LD-98-EO		626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	655A		A	ZER
1	EA	DOOR CONTACT	1076D-G		GRY	SEN

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG.










Lansing School District – Newcomer Center Remodeling

Hardware Group No. 25

For use on Door #(s):

106C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		630	IVE
1	EA	PANIC HARDWARE	LD-98-EO		626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	655A		A	ZER
1	EA	DOOR CONTACT	1076D-G		GRY	SEN

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG.










Lansing School District – Newcomer Center Remodeling

Hardware Group No. 26

For use on Door #(s):

120A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW/SW (SIZE AS REQ'D) NRP - CONFIRM HINGE REQ. TO MATCH EXISTING DOOR/FRAME PREPS		630	IVE
1	EA	PANIC HARDWARE	LD-98-EO-990		626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	655A		A	ZER
1	EA	DOOR CONTACT	1076D-G		GRY	SEN

NOTES:

1) FIELD VERIFY EXISTING CONDITIONS. VERIFY/COORDINATE PREPS ON EXISTING DOORS AND FRAMES TO ENSURE THE COMPATIBILITY OF NEW HARDWARE PRIOR TO ORDER OF NEW MATERIALS. PROVIDE FIELD MODIFICATIONS AND/OR NECESSARY FILLERS (PAINT TO MATCH WHERE EXISTING IS PREVIOUSLY PAINTED), REINFORCEMENTS AND FASTENERS, COMPATIBLE WITH EXISTING MATERIALS REQUIRED FOR MOUNTING NEW SPECIFIED HARDWARE AND TO COVER EXISTING DOOR AND FRAME PREPARATIONS.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

DOOR CONTACT MONITORS WHETHER THE DOOR IS OPENED, CLOSED OR HELD OPEN TOO LONG.

Hardware Group No. 27

For use on Door #(s):

126

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
			HARDWARE BY DOOR MANUFACTURER			

Hardware Group No. 28

For use on Door #(s):

103A 108A 117

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
			EXISTING TO REMAIN			

END OF SECTION 087100

SECTION 088000
GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Doors.
 - 2. Glazed entrances.
 - 3. Storefront framing.
- B. Related Sections include the following:
 - 1. Division 08 Section "Hollow Metal Doors and Frames" for installation of glazing.
 - 2. Division 08 Section "Flush Wood Doors" for installation of glazing.
 - 3. Division 08 Section "Aluminum Framed Entrance and Storefronts" for glazing.

1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind and snow action.
 - 1) Load Duration: 30 days.
 - d. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.

- 2) For insulating glass.
 - 3) For laminated-glass lites.
- e. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
- 1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 2. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass, laminated glass, and insulating glass.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- D. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant,

gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

- E. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- F. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and local codes.
 - 1. IGMMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass

units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 5 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.

2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
3. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Manufacturer's standard sealants.
4. Spacer Specifications: Manufacturer's standard spacer material and construction.
5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Corner Construction: Manufacturer's standard corner construction.

2.3 FIRE-RATED GLAZING PRODUCTS (FRG)

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
- B. Monolithic Ceramic Glazing: Proprietary Category II Safety Glazing Products in the form of clear, ceramic flat glass; 1/4-inch nominal thickness.
 1. Basis-of-Design products: Subject to compliance with requirements, provide one of the following:
 - a. Safti First; SuperLite 20.
 - b. Safti First; SuperLite II-XL (3/4") for 45 minute rating.
 - c. Safti First; SuperLite II-XL (1-1/8") for 60 minute rating.
 - d. Safti First; SuperLite II-XL (1-1/2") for 90 minute rating and 120 minute rating.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 1. Neoprene, ASTM C 864.
 2. EPDM, ASTM C 864.
 3. Silicone, ASTM C 1115.
 4. Thermoplastic polyolefin rubber, ASTM C 1115.
 5. Any material indicated above.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
 1. Neoprene.
 2. EPDM.

3. Silicone.
 4. Thermoplastic polyolefin rubber.
 5. Any material indicated above.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with outdoor and indoor faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.9 MONOLITHIC FLOAT-GLASS UNITS

- A. Uncoated Clear Float-Glass Units: Class I (clear) annealed or Kind HS (heat-strengthened) float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance requirements and Kind FT (fully tempered) float glass.

2.10 TEMPERED GLAZING TYPES

- A. Glass Type **GL-1**: Class I (clear), fully tempered float glass, ¼ inch nominal thickness.
 - 1. Provide safety glazing labeling.

2.11 FIRE PROTECTED RATED GLAZING TYPES

- A. Glass Type **GL-2**: 20 minute fire rated glazing without hose-stream test; monolithic ceramic glazing.
 - 1. Provide safety glazing labeling. (Cat II).
 - 2. Fully Tempered
- B. Glass Type **GL-3**: 45 minute fire rated glazing without hose-stream test; monolithic ceramic glazing.
 - 1. Provide safety glazing labeling. (Cat II).
 - 2. Fully Tempered
- C. Glass Type **GL-4**: 90 minute fire rated glazing without hose-stream test; monolithic ceramic glazing.
 - 1. Provide safety glazing labeling. (Cat II).
 - 2. Fully Tempered

2.12 INSULATING-GLASS UNITS

- A. Low-E Insulating-Glass Units **GL-5**; At all exterior glazing and where insulating glass is indicated, provide low-emissivity insulating-glass units complying with the following:
 - 1. Available Products:
 - a. Viracon.
 - b. PPG.
 - c. LOF
 - d. Pilkington
 - 2. Overall Unit Thickness: 1 inch
 - 3. Thickness of Each Glass Lite: 6.0 mm.
 - 4. Interspace Content: Air.
 - 5. Outdoor Lite: Class 1 float glass. Provide Kind HT (heat tempered) float glass in place of annealed or Kind HS (heat strengthened) where safety glass is required by code.
 - 6. Indoor Lite: Clear Low-E. Provide Kind HT (heat tempered) float glass in place of annealed or Kind HS (heat strengthened) where safety glass is required by code.
 - 7. Low-E Coating: Pyrolytic or sputtered on third surface.
 - 8. Visible Light Transmittance: 70 percent minimum.
 - 9. Winter Nighttime U-Factor: 0.29 maximum.
 - 10. Summer Daytime U-Factor: 0.27 maximum.
 - 11. Solar Heat Gain Coefficient: 0.38 maximum.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.8 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass mfg.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass mfg.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass mfg.

END OF SECTION 088000

SECTION 092900
GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior/Exterior gypsum board.
 - 2. Tile backing panels.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.
 - 2. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
 - 3. Division 09 painting Sections for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

- A. Material Compliance Certificate: Submit completed Material Compliance Certificate as described in Specification Section 013300 – Architect's Submittal Procedures.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

1.5 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum; Firebloc Type C.
 - b. CertainTeed Corp.; ProRoc Type C.
 - c. Georgia-Pacific Gypsum LLC; Fireguard C.
 - d. Lafarge North America Inc.; Firecheck Type C.
 - e. National Gypsum Company; Gold Bond Fire-Shield C.
 - f. USG Corporation; Firecode C Core.
- B. Regular Type:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- C. Type X:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.

- D. Abuse-Resistant Type: Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
- E. High-Impact Type: Manufactured with Type X moisture resistant core fiberglass reinforced for greater resistance to through-penetration (impact resistance).
 - 1. Core: 5/8 inch thick.
- F. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.

2.3 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board:
 - 1. Complying with ASTM C 1178/C 1178M.
 - a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum.
 - 2. Complying with ASTM C1177/C 1177M.
 - a. Product: Subject to compliance with requirements, provide "DensArmor Plus Interior Guard" by G-P Gypsum.
 - 3. Core: 5/8 inch, Type X.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Paper-faced galvanized steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - c. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.

- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 4. Tile Backing Panels: As recommended by panel manufacturer
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
- E. Joint Compound for Exterior Applications:
 - 1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.
- J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

- 1. Regular Type: As indicated on Drawings.
- 2. Type X: Where required for fire-resistance-rated assembly.
- 3. Abuse-Resistant Type: All wall surfaces from floor to 8'-0" above finished floor and all ceilings below 9'-0" above finished floor unless noted as high-impact location. See partition types for additional locations.
- 4. High-Impact Type: Storage rooms, non-tile toilet room walls and all corridor walls from floor to 8'-0" above finished floor, Locker room ceilings, and as indicated on Drawings.
- 5. Moisture- and Mold-Resistant Type: Ceilings in Toilet rooms, shower areas, janitor closets, kitchen areas, and as indicated on Drawings. Walls in janitor closets, kitchen areas, and as indicated on drawings.
- 6. Combination wall boards: Provide combination of Type-X, moisture resistant, abuse resistant and impact resistant where more than one requirement is listed for a use.

B. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
- 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Applications

- 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLATION OF EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
 2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

- B. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2. U-Bead: Use at exposed panel edges.

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile and Panels that are substrate for acoustical tile and where indicated on Drawings.
 - 3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 096513
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. See Division 9 "Ceramic Tiling" Specification for metal transitions.

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product with selected color(s) indicated.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.
- B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum horizontal surfaces thoroughly.
 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

3.6 RESILIENT WALL BASE SCHEDULE

- A. Resilient Wall Base (**RB-1**): Where this designation is indicated, provide the following:
 1. Product: Roppe
 2. Color & Pattern: 150 Dark Grey
 3. Type (ASTM F 1861): Type TV (vinyl, thermoplastic)
 4. Group: Group 2 (solid, layer)
 5. Style: Cove (with top set toe)
 6. Minimum Thickness: 0.125 inches
 7. Height: 4 inches
 8. Lengths: Coils in manufacturer's standard length
 9. Outside Corners: Job formed
 10. Inside Corners: Job formed

11. Finish: Satin, Smooth.

B. Resilient Transition (**RT**): Where this designation is indicated, provide the following:

1. Description: WLK-OFF Carpet to Resilient Sheet Flooring (RAF-1)
 - a. Product: Equal to Johnsonite
 - b. Profile and Dimensions: CTA-XX-M (ADA COMPLIANT)
 - c. Width: 2 ½ inches
 - d. Material: Vinyl
 - e. Color: To match rubber base in the same room.

C. Resilient Transition (**RT**): Where this designation is indicated, provide the following:

1. Description: LVT to Existing Floor
2. Product: Equal to Johnsonite; Exposed Surface Threshold
3. Profile and Dimensions: CTA-XX-J
4. Width: 1 ¾ inches
5. Material: Vinyl
6. Color: To match rubber base in the same room.

END OF SECTION 096513

SECTION 096519
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 1 / Unit Pricing specification for moisture mediation.

1.2 SUMMARY

- A. Section Includes:

- 1. Luxury vinyl tile.

1.3 RELATED REQUIREMENTS:

Section 096513 "Resilient Base and Accessories" and Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same product run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
 - 2. Flooring contractor will be responsible for the proper product installation, including floor preparation in all the areas indicated in the drawings to receive LVT.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following periods:
 - 1. 72 hours before installation.
 - 2. During installation.
 - 3. 72 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 72 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL FLOOR TILE (LVT-#)

1. Interface
 - a. Manufacturer's Rep:
 - 1) Charles Timmerman
 - 2) Email: Chuck.Timmerman@interface.com
 - 3) Mobile: 616-481-1719

- B. Studio Set: **LVT-1**
 1. Product: Studio Set
 2. Color: A00701 Silverlight
 3. Product Construction: High Performance Luxury Vinyl Tile
 4. Class / ASTM F1700 Class III Printed Vinyl Tile
 5. Wear Layer Thickness: 22 mil
 6. Total Thickness: 4.5 mm
 7. Backing Class Commercial Grade
 8. Finish: Ceramor™
 9. Nominal Dimensions: 25 cm x 1 m (9.845 in x 39.38 in)
 10. Warranty: 15 year Standard LVT Warranty
 11. Installation: Ashlar

2.3 INSTALLATION MATERIALS

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

- B. Adhesives: Commercialon® Premium Modular/LVT Pressure Sensitive Adhesive, a premium modular flooring adhesive specifically formulated for bonding J+J Flooring's Luxury Vinyl Tile to the floor
 1. Adhesives shall comply with the following limits for VOC content:
 - a. Composition Tile Adhesives: 50 g/L or less.
 2. Adhesives shall be manufacturer's recommended for 5 lbs and water/1000 sq. ft.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

 2. Examine and verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive flooring.

3. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
 4. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
 5. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by manufacturer and adhesive materials manufacturer.
 6. Verify that required floor-mounted utilities are in correct location.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
1. Coordinate building expansion joint trim with flooring.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
1. At least 72 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
 - 2. See Color Layout plans for details.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern of colors and sizes indicated on color layout drawings.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
 - 1. Install at base cabinet interior without toe kicks.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.

- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096723
RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Resinous flooring systems.
 - a. Moisture barrier as approved for system. Unit cost per square foot.
- 2. Related Sections:
 - a. Section 079200 "Joint Sealants" for sealants installed at joints in resinous flooring systems.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference per Division 1 specifications.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: 12" x 12" sample for each type of exposed finish required.
- C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.
- D. Data on concrete moisture levels and alkalinity testing.

1.5 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

- B. Material Certificates: For each resinous flooring component, from manufacturer.
- C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 - 1. Installer to have a minimum of 5 years' experience installing the specified systems.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 100 SF floor area selected by Architect for each system.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for 48 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Basis of Design: Sherwin Williams/ Resuflor Deco Flake BC
 2. Architect's Pre-approved equal.

2.2 MATERIALS

- A. VOC Content of Liquid-Applied Flooring Components: Not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

2.3 HIGH-PERFORMANCE RESINOUS FLOORING **REF-1**

- A. Resinous Flooring: Abrasion-, impact- and chemical-resistant, high-performance resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- B. System Characteristics:
1. Color and Pattern: Resuflor Deco Flake BC – ¼" Flake
 - a. Sherwin Williams Co: swflooring@sherwin.com
 - b. Color: Sherwin Williams – Modern Camo
 2. Wearing Surface: Provide slip resistant finish (Orange Peel Texture)
 3. Overall System Thickness: 20-30 mils nominal thickness
- C. Body Coats:
1. Resuflor Deco Flake BC:
 - a. Primer: Resuprime 3579 at 200-300 sq. ft. per gallon.
 - b. Body Coat: Resuflor 3746 at 200-300 sq. ft. per gallon.
 - c. Broadcast: Decorative Flakes 6750 to excess at 100-200 lbs. per 1,000 sq. ft.
 - d. Grout Coat: Resuflor 3746 at 160-250 sq. ft. per gallon.
 - e. Seal Coat (foot traffic areas only, no seal coat in Teaching Lab 104): Resutile 4686 at 250-400 sq. ft. per gallon.
 - f. 4" integral epoxy cove base
- D. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Compressive Strength: 10,000 per ASTM C 579.
 2. Flexural Modulus of Elasticity: 4,300 per ASTM C 580.
 3. Coefficient of Thermal Expansion: 1.8×10^{-5} in/in per ASTM C 531.
 4. Impact Resistance: Direct, inch pound greater than 160, passes Reverse, inch pound greater than 80, passes
 5. Abrasion Resistance: ASTM D 4060, CS-17 Wheel, 1,000 cycles

6. Hardness: 85-90, Shore D per ASTM D 2240.

2.4 ACCESSORIES

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated.
 1. Formulation Description: 100 percent solids.
- B. Waterproofing Membrane: Type recommended by manufacturer for substrate and primer and body coats indicated.
 1. Formulation Description: 100 percent solids.
- C. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- D. Metal Transitions: Equal to Schluter Reno-Ramp/K

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. Roughen concrete substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C811 requirements unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft of slab area in 24 hours.
 - b. Plastic Sheet Test: ASTM D4263. Proceed with application only after testing indicates absence of moisture in substrates.

- c. Relative Humidity Test: Use in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement.
- 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing, as approved by manufacture.
- C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
 - 1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.
- D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.

3.2 INSTALLATION

- A. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended by manufacturer.
- D. Grout Coat: Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat.
- E. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.

3.3 TERMINATIONS

- A. Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.
- B. Penetration Treatment: Lap and seal the flooring system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

- C. Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
- D. Treat floor drains by chasing the flooring system to lock in place at point of termination.

3.4 JOINTS AND CRACKS

- A. Treat control joints to bridge potential cracks and to maintain monolithic protection.
- B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.
 - 1. Provide thermal break between freezer and kitchen.

3.5 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may, at any time and any number of times during resinous flooring application, require material samples for testing for compliance with requirements.
 - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
 - 3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.
- B. Core Sampling: At the direction of Owner and at locations designated by Owner, take one core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.
- C. Areas of inconsistent applications of decorative flake will be replaced at Owner's discretion

3.6 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 096723

SECTION 096813
TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Walk-Off carpet
- B. Related Requirements:
 - 1. Section 096513 "Resilient Base and Accessories" and Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 10 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Master II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 - 3. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE WALK-OFF CARPET (AT VESTIBULE LOCATIONS)

- A. Interface
 - 1. Pattern: Step Repeat Collection
 - 2. Color: 104940 Iron
 - 3. Backing: GlasBac
 - 4. Manufacturer's Rep:
 - a. Charles Timmerman
 - b. Email: Chuck.Timmerman@interface.com
 - c. Mobile: 616-481-1719
- B. Product Number: 1388602500
- C. Product Construction: Tufted Textured
- D. Loop Yarn System: 100% Recycled Content Nylon
- E. Yarn Manufacturer: Aqual
- F. Dye Method: 100% Solution Dyed
- G. Preservative Protection: InterSept®
- H. Tufted Yarn Weight: 26 oz/yd²
- I. Machine Gauge: 1/12
- J. Pile Height: 0.20 in
- K. Pile Thickness: 0.14 in

- L. Stitches: 10.00 /in
- M. Pile Density: 6,545 oz/yd³
- N. Size: 19.69 in x 19.69 in
- O. Adhesive: Manufacture Standard
- P. Flooring Radiant Panel: (ASTM E-648) Passes
- Q. Smoke Density: (ASTM E-662) ≤ 450
- R. Flammability Passes Methenamine Pill Test (DOC-FF1-70)
- S. Lightfastness (AATCC 16 - E) $\geq 4.0 @ 60$ AFU's
- T. Static (AATCC - 134) < 3.0 KV
- U. Installation Method: Monolithic
- V. Warranty: 15 year Standard

2.3 INSTALLATION ACCESSORIES

- W. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- X. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

- a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft.in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inchwide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099124
INTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel and iron.
 - 2. Galvanized metal.
 - 3. Gypsum board.
 - 4. Cotton or canvas insulation covering.
- B. Related Requirements:
 - 1. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
 - 2. Section 099600 "High-Performance Coatings" for tile-like coatings.
 - 3. See Mechanical Sheet GHX1.32 for geo piping painting.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 2. Indicate VOC content.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
 2. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 1. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 2. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 1. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Process documentation: time stamped photos of each layer of the system at application to document the primer, intermediate coat and topcoat have all been applied.
 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: See Schedule at the end of Part 3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer [.] but not less than the following:
 - 1. SSPC-SP 7/NACE No. 4.
 - 2. SSPC-SP 11.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - 1. Equipment, including panelboards and switch gear.
 - 2. Uninsulated metal piping.
 - 3. Uninsulated plastic piping.
 - 4. Pipe hangers and supports.
 - 5. Metal conduit.
 - 6. Plastic conduit.
 - 7. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - 1. Equipment, including panelboards.
 - 2. Uninsulated metal piping.
 - 3. Uninsulated plastic piping.
 - 4. Pipe hangers and supports.
 - 5. Metal conduit.
 - 6. Plastic conduit.
 - 7. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 8. Other items as directed by Architect.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Water-Based Dry-Fall System , MPI INT 5.1CC:
 1. Prime Coat: Primer, alkyd, anticorrosive, for metal , MPI #79.
 2. Topcoat: Dry fall, latex, flat , MPI #118.
 3. Topcoat: Dry fall, water based, for galvanized steel, flat (MPI Gloss Level 1) , MPI #133.

B. Gypsum Board Substrates:

1. High-Performance Architectural Latex System , MPI INT 9.2B:
 1. Prime Coat: Primer sealer, latex, interior , MPI #50.
 2. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 3. Topcoat: Latex, interior, high performance architectural (MPI Gloss Level 2) , MPI #138.

C. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings .

1. Latex System , MPI INT 10.1B:
 1. Prime Coat: Primer sealer, latex, interior.
 - 1) MPI # 17 (PER MPI 2020)
 2. Intermediate Coat: Alkyd, interior, matching topcoat.
 3. Topcoat: Latex, interior, flat (MPI Gloss Level 1).
 - 1) MPI # 53

3.6 INTERIOR PAINTING SCHEDULE RELATED TO LOCATION

1. Gypsum Ceiling & Bulkheads; High Performance Architectural Latex (Satin) MPI #138 (Gloss Level 2).
2. Exposed Metal Ceilings; Waterborne Dry Fall MPI #118 & MPI #133. (Do not paint galvanized mechanical ducts where noted).
3. Walls; See Specification 099600 High Performance Coatings for Epoxy Paint.
4. Steel Door and Borrowed Light Frames, Metal Railing, and Columns; See Specification 099600 High Performance Coatings for Epoxy Paint.

3.7 INTERIOR PAINT COLOR SCHEUDLE

1. Interior Paint **P-1**: Where this paint color designation is indicated; provide the following:
 - a. Manufacturer: To match Sherwin Williams
 - b. Color: 7004 Snowbound
2. Interior Paint **P-2**: Where this paint color designation is indicated; provide the following:
 - a. Manufacturer: To match Sherwin Williams
Color: 9140 Blustery Sky
3. Interior Paint **P-3**: Where this paint color designation is indicated; provide the following:

- a. Manufacturer: To match Sherwin Williams
 - b. Color: 7067 Cityscape
4. Interior Paint **P-4**: Where this paint color designation is indicated; provide the following:
- a. Manufacturer: To match Sherwin Williams
 - b. Color: 7007 Ceiling Bright White

END OF SECTION 099124

SECTION 099600
HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:
 - 1. Interior Substrates:
 - a. Steel.
 - b. Galvanized metal.
 - c. Gypsum board.

1.3 DEFINITIONS

- A. MPI Gloss Level 3: 10-25 at 60 degrees, according to ASTM D523
- B. MPI Gloss Level 4: 20-35 at 60 degrees, according to ASTM D523

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Label each coat of each Sample.
 - 3. Label each Sample for location and application area.

- C. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- C. Colors: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 1. SSPC-SP 6/NACE No. 3.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- G. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates:
 - 1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer and High-Build Epoxy System MPI EXT 5.1G:
 - a. Prime Coat: Primer ,zinc rich, epoxy, MPI #20
 - b. Intermediate Coat: Epoxy, high build, low gloss, MPI #108
 - c. First and Second Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 6), MPI #72

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Water Based Light Industrial Coating MPI INT 5.1N:
 - a. Prime Coat: Primer, Epoxy, Anti-corrosive, for metal MPI #101.
 - b. Intermediate Coat: Epoxy-modified latex, interior, matching topcoat.
 - c. Topcoat: Waterbased Light Industrial Coating (MPI Gloss Level 3), MPI #151

B. Galvanized-Metal Substrates: (NON-CHROMATE PASSIVATED)

1. Water Based Light Industrial Coating MPI INT 5.3K:
 - a. Prime Coat: Primer, water-based galvanized, MPI #134.
 - b. Intermediate Coat: Epoxy, matching topcoat.
 - c. Topcoat: Waterbased Light Industrial Coating (MPI Gloss Level 3), MPI #151

C. Gypsum Board Substrates:

1. Water Based Light Industrial Coating MPI INT 9.2L:
 - a. Prime Coat: Primer sealer, latex, interior , MPI #50.
 - b. Intermediate Coat: Epoxy-modified latex, matching topcoat.
 - c. Topcoat: Waterbased Light Industrial Coating (MPI Gloss Level 3), MPI #151

END OF SECTION 099600

SECTION 101100
VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Visual display board assemblies.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
 - 2. Provide data on surface materials.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 VISUAL DISPLAY BOARD ASSEMBLY **VDB**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CIG-JAN Products, Ltd.
 - 2. Claridge Products and Equipment, Inc.
 - 3. Egan Visual, Inc.
 - 4. Marsh Industries, Inc.
 - 5. PolyVision Corporation
 - 6. Architect's pre-approved equal.

- B. Visual Display Board Assembly: Factory fabricated.
 - 1. Assembly: Markerboard.
 - 2. Corners: Square
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
 - 5. Mounting Method: Direct to Wall / Mechanical Method. No Adhesive.
- C. Markerboard Panel: Porcelain-enamel-faced markerboard panel on core indicated.
 - 1. Color: White.
- D. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; standard size and shape.
 - 1. Aluminum Finish: Clear anodic finish.
- E. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
- F. Combination Assemblies: Provide manufacturer's standard exposed trim between abutting sections of visual display panels.
- G. Display Rail: Manufacturer's standard, extruded-aluminum display rail with plastic-impregnated-cork insert, end stops, and continuous paper holder, designed to hold accessories.
 - 1. Size: 2 inches high by length indicated on Drawings.
 - 2. Map Hooks and Clips: Two map hooks with flexible metal clips for every 48 inches of display rail or fraction thereof.
 - 3. Flag Holder: One for each room.
 - 4. Magnetic Marker Cup: White
 - 5. Tackboard Insert Color: To Match Forbo Bulletin Board #2182 Potato Skin
 - 6. Aluminum Color: Match finish of visual display assembly trim.

2.3 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
 - 1. Provide CeramaP3 or equal.
- B. Plastic-Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout.
- C. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq.yd.; with surface-burning characteristics indicated.
- D. Hardboard: ANSI A135.4, tempered.
- E. Particleboard: ANSI A208.1, Grade M-1.

- F. Extruded Aluminum: ASTM B221, Alloy 6063.
- G. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.
- H. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Section 099123 "Interior Painting" and recommended in writing by visual display unit manufacturer for intended substrate.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.

- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive visual display units and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Factory-Fabricated Visual Display Board Assemblies: Adhere to wall surfaces with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
- C. Factory-Fabricated Visual Display Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches o.c. Secure tops and bottoms of boards to walls.
- D. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 101100

SECTION 101423.16
ROOM-IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes room-identification signs that are directly attached.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements , including raised characters and Braille, and layout for each sign at least .
- C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Room-Identification Signs: Full-size Sample .
 - 2. Full-size Samples, if approved, will be returned to Contractor for use in Project.

- D. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" the ABA standards of the Federal agency having jurisdiction and ICC A117.1 .

2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign : Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. APCO Graphics, Inc.; Equal
 - b. ASI Sign Systems, Inc.; InTac Series
 - c. Inpro Corporation; Equal
 - d. Takeform; Fusion
 - 2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: Manufacturer's standard for size of sign .
 - b. Surface-Applied Graphics: Applied vinyl film .
 - c. Color(s): Panel Plate/ Back Plate - SW Cityscape 7067, Lettering – White

3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition : Square cut .
 - b. Corner Condition in Elevation: Square .
4. Mounting: Surface mounted to wall with concealed fasteners
5. Text and Typeface: Accessible raised characters and Braille typeface as selected by Architect from manufacturer's full range and variable content as scheduled . Finish raised characters to contrast with background color, and finish Braille to match background color.

2.3 SIGN MATERIALS

- A. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as indicated on Drawings.
- C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. A. Provide back plate for signs to be mounted on glass

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner .

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 INSTALLATION

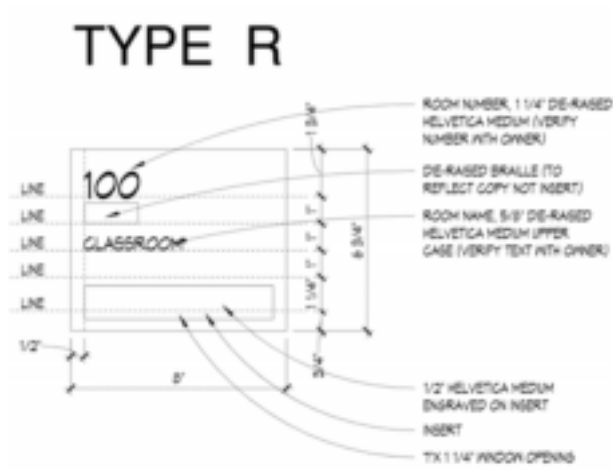
- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls and according to the accessibility standard .
- C. Mounting Methods:
 1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. For all glass mounted signage, provide matching back plate on opposite side to conceal mounting method.

3.2 ADJUSTING AND CLEANING

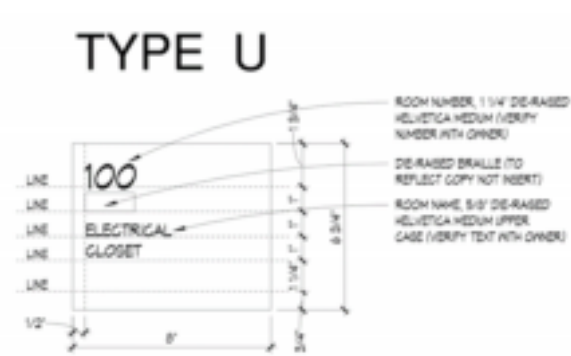
- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.3 SCHEDULE

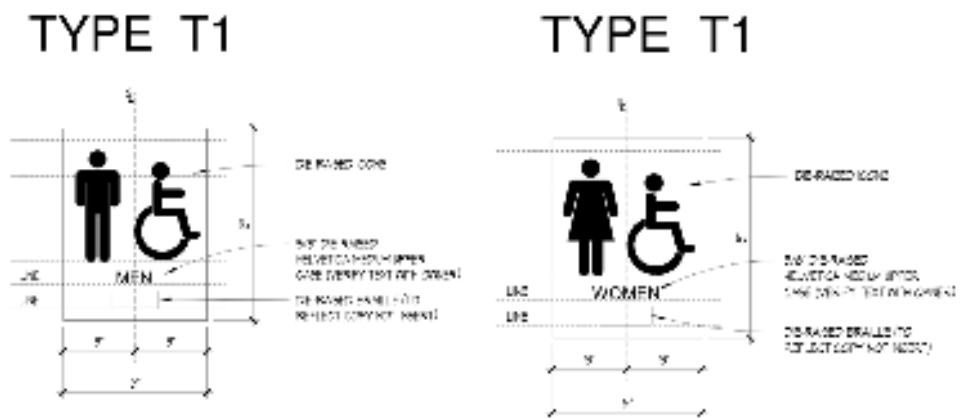
A. Type R



B. Type U



C. Type T1



D.

END OF SECTION 101423.16

SECTION 102113.17
PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
- 2. Show locations of cutouts for compartment-mounted toilet accessories.
- 3. Show locations of centerlines of toilet fixtures.
- 4. Show locations of floor drains.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

- 1. Include Samples of hardware and accessories involving material and color selection.

D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Door Hinges: One hinge with associated fasteners.
 - 2. Latch and Keeper: Two latches and keepers with associated fasteners.
 - 3. Door Bumper: One door bumper with associated fasteners.
 - 4. Door Pull: One door pull with associated fasteners.
 - 5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARTMENTS

- A. Manufacturers subject to compliance:
 - 1. ASI Global Partitions – Ultimate Privacy
 - 2. Bradley
 - 3. Bobrick

4. General Partition
 5. Metpar
 6. Architect's approved equal.
- B. Toilet-Enclosure Style: Floor anchored.
- C. Urinal-Screen Style: Wall hung.
- D. Door, Panel and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges and no-sightline system. Provide 3/4-inch-thick doors and pilasters and minimum 1/2-inch-thick panels.
- E. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- F. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- G. Phenolic-Panel Finish:
1. Facing Sheet Finish: One color and pattern in each room.
 2. Color and Pattern: As selected by Architect from manufacturer's full range.
 - a. Basis of Design: ASI Global Partitions - Dove Gray 3010

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.
1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless-steel paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door. Mount with through-bolts.
 2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
 4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
 5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Floor Anchored Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.17

SECTION 102600
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Abuse-resistant wall coverings
 - 2. Corner guards.
 - 3. End-wall guards.

1.3 RELATED DRAWINGS

- 1. Equipment and Color Layout plans for locations and extents

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
 - 1. Wall Protection : 5 x 7 samples
 - 2. Corner Guards: 12 inches long. Include example top caps.
- C. Shop drawing indicating location, height and color for review.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 MAINTAINANCE AND MATERIAL SUBMITTALS

- A. Provide 1 additional unit for each type specified.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic materials out of direct sunlight.
 - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 - 2. Warranty Period: Five 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall- and door-protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 ABUSE-RESISTANT WALL COVERINGS

- A. Abuse-Resistant Sheet Wall Covering **WP-1**: Fabricated from semirigid, plastic sheet wall-covering material.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Basis of design Inpro
 - a. Construction Specialties, Inc. Equal color
 - b. Inpro Corporation.
 - c. Altro Tegulis Wall Protection Panel
 - 1) Height: 10' feet
 - 2) Size: 48 by 96 inches 4' x 9' 10"/ 1.22m x 3.0m
 - 3) Pattern: Subway tile 3" x 6"
 - 4) Color: Flint
 - 5) Jointing: Interlocking
 - 6) Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
 - 7) Mounting: Follow instructions detailed in the Altro Tegulis Installation Guide.

2.4 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards CG-## : Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Basis of design Inpro
 - a. Inpro Corporation.
 - 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
 - a. Profile: Nominal 3-inch-long leg and 1/4-inch corner radius .
 - b. Height: 8 feet

- c. Color:
 - 1) Color: Inpro – Feather 0238
 - d. Continuous Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum .
3. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Flush-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard , PVC-free assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Inpro Corporation.
- 2. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows
 - a. Profile: Nominal 3-inch-long leg and 1/4-inch corner radius .
 - b. Height: as indicated on drawings in feet
- 3. Continuous Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum.

2.5 END-WALL GUARDS

A. Flush-Mounted, Plastic-Cover, End-Wall Guard: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer at each corner, with end of wall covered by semirigid, abuse-resistant wall covering; including mounting hardware.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Inpro Corporation.
- 2. Cover: Extruded rigid plastic, minimum 0.078-inch 0.100-inch wall thickness; as follows:
 - a. Profile: Nominal 3-inch-long leg and 1-1/4-inch corner radius
 - b. Height: as indicated on equipment drawings in feet
 - c. Color:
 - 1) Color: Inpro – Feather 0238
- 3. Retainer: Minimum 0.060-inch-thick, one-piece, extruded aluminum.

2.6 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
- C. Adhesive: As recommended by protection product manufacturer.

2.7 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.8 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances , fire rating, and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings. If not indicated on Drawings, coordinates with architect.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
- D. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.
- E. Fire Doors: Install protection according to the listing of each item.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Public-use washroom accessories.
- B. Owner-Furnished Material: See accessory list for owner supplied items.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- C. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.
- B. Toilet Tissue Dispenser: **TA1**
 - 1. Furnished by Owner and installed by Contractor.
- C. Paper Towel Dispenser: **TA2**
 - 1. Furnished by Owner and installed by Contractor.

D. Liquid-Soap Dispenser: **TA3**

1. Furnished by Owner and installed by Contractor.

E. Sanitary-Napkin Disposal Unit: **TA4**

- 1) Basis-of-Design Product: Bobrick #B-254.
- 2) Mounting: Surface mounted.
- 3) Door or Cover: Self-closing, disposal-opening cover.
- 4) Receptacle: Removable.
- 5) Material and Finish: Stainless steel, No. 4 finish (satin).

F. Grab Bar: **TA5**

1. Basis-of-Design Product: Bobrick #B-5806X42
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: One piece grab bar, 42" length.

G. Grab Bar: **TA6**

1. Basis-of-Design Product: Bobrick #B-5806X36
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: One piece grab bar, 36" length.

H. Grab Bar: **TA7**

1. Basis-of-Design Product: Bobrick #B-6806.99X18.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: 18"
6. Mounting: Mount vertical on side wall above grab bar. Center 40" from back wall and set bottom of bar at 40" above floor.

I. Mirror Unit: **TA8**

1. Basis-of-Design Product: Bobrick #B-165
2. Frame: Stainless-steel channel.

- a. Corners: Welded and ground smooth.
- 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- 4. Size: 24"w x 36"h.

2.2 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.2 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.3 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.
- B. Related Sections:
 - 1. Division 10 Section "Fire Extinguishers."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209.
 - 2. Extruded Shapes: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
- B. Basis of Design: Subject to compliance with requirements, provide CS Series School Cabinet Heavy Duty, as manufactured by J. L. Industries, Inc., a division of Activar Construction Products Group or comparable product by one of the following:
 - a. CS Series School Cabinet Heavy Duty, as manufactured by J. L. Industries, Inc., a division of Activar Construction Products Group
 - b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
 - c. Larsen's Manufacturing Company.
- C. Cabinet Construction: Nonrated.

- D. Cabinet Material: Steel sheet.
- E. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - 1. Rolled-Edge Trim: 2-1/2-inch or 4" as required for wall type backbend depth.
- F. Cabinet Trim Material: Same material and finish as door.
- G. Door Material: 12 gauge steel.
- H. Door Style: Vertical duo panel with frame.
- I. Door Glazing: Tempered float glass (clear).
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide recessed door pull and friction latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- L. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Interior of cabinet.
 - 2. Aluminum:
 - a. Door: Clear anodized.
 - 3. Steel: Baked enamel or powder coat.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
 - 3. Prepare doors and frames to receive locks.
 - 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm.

2.6 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated.
 1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
 2. Provide inside latch and lock for break-glass panels.
 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections:
 - 1. Division 10 Section "Fire Extinguisher Cabinets."

1.3 SUBMITTALS

- A. Material Compliance Certificate: Submit completed Material Compliance Certificate as described in Specification Section 013300 – Architect's Submittal Procedures.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - c. Larsen's Manufacturing Company.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: UL-rated 4-A: 60-B-C, 10-lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 105113
METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. All welded metal, corridor lockers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
- B. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.

- C. Samples: For each color specified, in manufacturer's standard size.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. The following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
 - a. Locks.
 - b. Blank identification plates.
 - c. Hooks.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.9 FIELD CONDITIONS

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

1.10 COORDINATION

- A. Coordinate sizes and locations of wood bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Welded Metal Lockers: 10 years from date of Substantial Completion.

1.12 PRODUCTS - MANUFACTURERS

- A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.
 - 1. Obtain locks from single lock manufacturer.

1.13 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers and locker benches indicated to be accessible, comply with applicable provisions in the ADA standards of the Federal agency having jurisdiction and ICC A117.1 .
- B. Basis-of-Design Product: Subject to compliance with requirements, Republic - Metal Storage Lockers or comparable product by the following.
 - 1. DeBourgh Mfg. Co.; Worley Lockers.
 - 2. List Industries Inc.; Lockers.
 - 3. Lyon Workspace Products, LLC; Lockers.
 - 4. Penco Products, Inc.
 - 5. Republic Storage Systems Company; Lockers.

- C. Material: Cold-rolled steel sheet.
- D. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet as follows:
1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
 3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.
- E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
 2. Frame Vents: Fabricate face frames with vents.
- F. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
1. Doors less than 12 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
 2. Doors for box lockers less than 15 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
 3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
 5. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 6. Door Style: Vented panel as follows:
 - a. Concealed Vents: Slotted perforations top and bottom horizontal return flanges of doors.
- G. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
- 1) Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 - 2) Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
 - 3) Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.

- H. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
- 1) Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
 - 2) Frame Vents: Fabricate face frames with vents.
- I. Hinges: Welded to door and attached to door frame with rivets that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Continuous Hinges: Manufacturer's standard, steel continuous hinge.
- J. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated with vinyl or nylon to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- K. Locks: Built-in combination locks.
- L. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:
1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 2. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
 3. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
 4. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet.
 5. Center Dividers: Fabricated from 0.024-inch nominal-thickness steel sheet.
 6. Steel Zee Base: Fabricated from 16 gauge steel 4" high.
- M. Finish: Baked enamel or powder coat.
- N. Locker Schedule:
1. **MLW-#**: Single Stack Locker w/ sloped top: 12" x 12"D x 72"
 - a. **MLW-1**: Republic - quiet corridor lockers/ single tier
 - 1) Colors: selected from manufacturer standard colors
 - b. Accessories:

- 1) Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet.
 - 2) Closures: Vertical-end type.
- c. Sloping-top corner fillers, mitered.

1.14 LOCKS

- A. Built-in combination locks.

1.15 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.
- E. Accessible Lockers: Fabricate as follows:
1. Locate bottom shelf no lower than 15 inches above the floor.
 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
1. Sloping-top corner fillers, mitered.

- G. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- I. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
- J. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

1.16 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers .
 - 3. Anchor back-to-back metal lockers to floor.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed metal lockers with concealed clips.
 - 2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.

2.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.
- B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation prior to substantial completion.
- C. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

2.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

SECTION 122413
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Manually operated roller shades with single rollers.

B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
- 2. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Product Schedule: For roller shades.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Draper, Inc.
 - 2. Hunter Douglas Contract
 - 3. Mechoshade Systems, Inc.
 - 4. Springs Window Fashions, SWF Contract.
 - 5. Creative Windows, Ann Arbor, MI
 - 6. Architect's Pre-Approved Equal
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Bead Chains: Stainless steel.
 - a. Loop Length: Full length of roller shade.

- b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 - 1. Roller Drive-End Location: Per schedule at the end of part 3.
 - 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- F. Shadebands:
 - 1. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Fascia, Fascia With Top and Back Cover - Aluminum fascia (4") with top or back cover (4") to conceal shade mechanism from front, sides, and top/back
 - b. Shapes and heights of fasciae vary among manufacturers.
 - c. Shape: L-shaped.
 - d. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches.
 - 2. Endcap Covers: To cover exposed endcaps.
 - 3. Installation Accessories Color and Finish: Clear Aluminum Color/Tone

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 - 1. Source: Roller shade manufacturer.
 - 2. Type: PVC-coated polyester.
 - 3. Weave: Basketweave.

4. Thickness: 0.030 inch
5. Roll Width: 32, 88, or 104 inches.
6. Orientation on Shadeband: Up the bolt.
7. Openness Factor: 3 percent
8. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

- B. Roller Shade Locations: As indicated on Equipment Drawings.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

ROLLER SHADE SCHEDULE ON DRAWING SHEET A1.11 EQUIPMENT DETAILS

SECTION 22 0005
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 22.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under item "A" above.

1.02 APPLICATION

- A. This section applies to all plumbing work. The contractors involved shall check all sections of the specifications in addition to the particular section covering their specific trade. Each distinct section of the specifications aimed for one trade may have detailed information with regards to other trades, therefore, it is imperative that all sections be reviewed to get a complete picture of all other trades' functions and work required.
- B. The plumbing contractor is responsible for the installation and operation of the plumbing systems.
- C. The plumbing contractor is responsible for receiving, unloading and placement of all of the owner provided equipment.

1.03 INSPECTION OF SITE

- A. Each Contractor shall visit the site prior to bid submission to determine all existing conditions that may affect his work and shall make appropriate allowances for such conditions in his bid. Failure to visit the site shall not be cause for a request for additional compensation later in the project during construction.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.
- C. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- D. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner before proceeding.

1.04 ALTERNATES AND SUBSTITUTIONS

- A. Refer to Division 01 - General Requirements for procedures to submit products by a Manufacturer that is not listed as approved equal in the Specifications.

1.05 DEVIATIONS FROM BASIS OF DESIGN MANUFACTURER

- A. Products identified within the schedules and details are used as the basis of design for laying out and coordinating with other trades such as structural, architectural, and electrical. Should Division 22 Contractor submit products by a manufacturer other than that indicated as Basis of Design in the Drawings, Contractor shall then be responsible for evaluating the impacts of the proposed Manufacturer's equipment, even if the Manufacturer is listed in the specifications as an approved equal. This includes the proposed Manufacturer's electrical, architectural and structural requirements and their subsequent impacts on the current design and coordination of any differing dimensions and clearances with all other trades. This evaluation shall be included as part of the proposed product submittal.

1.06 MATERIALS

- A. Plumbing equipment is to be furnished with motors, electrical controls and protective devices, and integral operating devices which are normally included by the manufacturer or required by the Contract Documents.
- B. The Plumbing trades shall provide all control wiring, 120 volts and less, for the equipment and devices furnished under Division 22 of these specifications, including all wiring devices, transformers, conduit, etc. Any conduits used for control wiring shall meet the specifications as indicated in Division 26.
- C. Power wiring 120 volts and greater shall be by the Electrical Trades.

1.07 CODES PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for plumbing work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations. Applicable publications listed in all sections of Division 22 shall be the latest issue, unless otherwise noted.
- B. Rules of local utility companies and municipalities shall be complied with. Check with the utility company and/or municipality supplying service to the installation and determine all devices including, but not limited to: meters, regulators, valves which will be required and include the cost of all such items in the proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.0 MAINTENANCE

- A. Provide 8 hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems.
- B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Manuals shall be submitted in electronic format for review. When approved, four (4) bound hard copies and an indexed electronic PDF shall be provided to the owner. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

1.09 WARRANT AND GUARANTEE

- A. Contractor shall guarantee all work installed by him or his subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as originally called for, dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications.
Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

1.10 SUBMITTALS

- A. Shop drawings and samples shall be submitted in compliance with the Conditions of the Contract and Division 1 General Requirements.
- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (plumbing piping, plumbing fixtures, etc.). Refer to other sections of the electrical specifications for additional requirements.

- C. Shop Drawings: Each piece of equipment shall be identified by the number shown in the schedules and by specification article number pertaining to the item. Shop drawings shall as a minimum be 1/4" equals 1' 0" scale, and shall be newly prepared by the Contractor and not reproduced from the Architect's drawings. Layouts shall be made for all floor plans including all ductwork, piping, electrical distribution and other mechanical equipment. Layouts shall show clearances of piping, ducts, etc., above floor.
- D. Contractor shall obtain Engineer's approval on all the work before any equipment is purchased, or any work installed. Contractor shall also secure approval of the Governmental Authorities having jurisdiction on all equipment and on the layout of the complete system.
- E. The Engineer's review and approval of shop drawings is a gratuitous assistance and in no way does it relieve the Contractor from responsibility for errors or omissions which may exist on the shop drawings. Where such errors or omissions are discovered later, they must be made good by the Contractor, without any additional cost to the Owner, irrespective of any approval by the Engineer.
 - 1. The Contractor shall incorporate with his shop drawings, a letter indicating all deviations from the plans and/or specifications. If in the opinion of the Architect, the deviations are not equal, the Contractor will be required to furnish the item as specified and as indicated on the drawings.
 - 2. Record documents shall be submitted in compliance with the requirements of the Specifications.
- F. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals not reviewed by Contractor; including Contractor stamp with signature comments.
 - 3. Submittals made after work is delivered to site and/or installed.
 - 4. Submittal resubmissions unless resubmission is required by Architect/Engineer.
- G. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.
- H. The engineer will not be responsible for errors in quantities, or dimensions required to fit the job condition, details of fabrication to insure proper assembly at the job, or for errors resulting from errors in submittals.
- I. For underground piping, record dimensions and invert elevations of all piping, including all offsets, fittings, cathodic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.

1.11 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures. All literature shall be furnished in accordance with requirements listed in Division 01.
- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.

1.12 QUALITY ASSURANCE

- A. Other referenced standards:
 - 1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE.

PART 2 PRODUCTS

2.01 SLEEVES AND ESCUTCHEONS

- A. Provide sleeves wherever pipes pass through exterior wall and floors. Sleeves shall be schedule 40 steel pipe cut to length. Sleeves shall terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide cast brass nickel-plated escutcheons with positive catches on each visible sleeve penetration. Sleeves are to be sealed at each installation with a 3M approved sealant. The space between the inside of the sleeve and the outside of the pipe or conduit within the sleeve shall be sealed at each installation with a 3M approved sealant.

2.02 DIELECTRIC UNIONS

- A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.
- B. Dielectric waterway fittings shall be a copper-silicon casting conforming to UNS C87850, and UL classified in accordance with ANSI / NSF-61 for potable water service.

2.03 BUILDING ATTACHMENTS FOR PLUMBING WORK SUPPORTS

- A. General Requirements:
 - 1. Provide building attachments required for supporting plumbing work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
 - 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
 - 3. If specially designed building attachments are required, retain the services of a licensed structural engineer to design such building attachments.
 - 4. Approved Manufacturers: Grinnell, or equivalent products by Michigan Hanger and B-Line.
 - 5. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
 - 1. Support plumbing work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.
 - a. Center beam clamp - for loads over 120 lb.: Malleable center hung Grinnell Fig. 228.
 - b. Side beam clamp with retaining clips - for loads up to 120 lb.
- C. Cast in Place Concrete Inserts:
 - 1. Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Grinnell Fig. 285 lightweight concrete insert for loads up to 400# or Grinnell Fig. 281 Wedge Type concrete insert for loads up to 1200#
- D. Drilled Insert Anchors:
 - 1. Where plumbing work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.

PART 3 EXECUTION

3.01 GENERAL

- A. Existing piping: when encountered during the course of work, protect, brace and support existing piping where required for proper execution of the work.

- B. Interruption of existing active piping: when the course of work makes shut-down of services unavoidable, the plumbing contractor shall schedule the shut-down at such time as approved by the owners representative, which will cause least interference with established operating routine.
- C. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderly fashion.
- D. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.
- E. Roof mounted equipment requiring service shall be located a minimum of 10 feet from roof edges. Where equipment can't be located away from roof edge and guard rails are not provided, provide permanent fall arrest anchorage connection device that complies with ANSI/ASSE Z 359.1.

3.02 INTERPRETATION OF CONTRACT DOCUMENTS

- A. Should there be discrepancy or a question of intent, refer matter to Architect/Engineer for decision before ordering any equipment or materials or before starting any related work.
- B. Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed or furnished as though mentioned in both Specifications and Drawings. If there is discrepancy between Drawings and Specifications as to quantity or quality to be provided, the greater quantity or better quality shall be provided.
- C. Minor items and accessories or devices reasonably inferable as necessary to complete and proper installation and operation of any system shall be provided by Contractor for such system whether or not specifically called for by Specifications or Drawings.
- D. Architect/Engineer may change location of any equipment 5' and any piping, ductwork, conduit, etc. 10' in any direction without extra charge, provided such changes are made before installation.
- E. Locations of items not definitely fixed by dimensions are approximate only and exact locations necessary to secure the best conditions and results shall be determined at the site and shall be subject to review and approval by Architect/Engineer.
- F. Follow drawings in laying out work, check drawings of other trades to verify spaces in which work will be installed, and maintain maximum headroom and space conditions at all points.
 - 1. Where headroom or space conditions appear inadequate, notify Architect or Owner's field representative before proceeding with installation.
 - 2. Pipe/duct rerouting and size changes shall be made at no additional cost to the Owner.
- G. Furnish advance information on locations and sizes of frames, boxes, sleeves and openings needed for the work, and also furnish information and shop drawings necessary to permit installation of other work without delay.
- H. Where there is evidence that parts of the Work specified in Divisions 21, 22, and 23 will interfere with other work, assist in working out space conditions to make satisfactory adjustments, revise and submit coordinated shop drawings.
- I. After review and without additional cost to the Owner, make minor modifications in the work as required by structural interferences, by interferences with work of other sections or for proper execution of the work.
- J. Work installed before coordinating with other work so as to cause interference with other work shall be changed and corrected without additional cost to the Owner.
- K. Drawings are diagrammatic in nature and are a graphic representation of requirements and shall be followed as closely as actual building construction will permit. All changes from the plans necessary to make the work conform to the building as constructed and to fit the work of other trades or to conform to rules of the Governmental Authorities having jurisdiction, NFPA, OSHA and the Owner's Insurance Underwriters, shall be made by the Contractor without extra cost to the Owner.

- L. The layout of the piping, ductwork, equipment, etc., as shown on the drawings shall be checked and exact locations shall be determined by the dimensions of the equipment approved and the Contractor shall obtain approval for the revised layout before the apparatus is installed. The Contractor shall field measure or consult existing record Architectural and Structural Drawings if available for all dimensions, locations of partitions, locations and sizes of structural supports, foundations, etc.
- M. Omission in the Drawings and/or Specifications of any items necessary for the proper completion or operation of the work outlined in this specification shall not relieve the Contractor from furnishing same without additional cost to the Owner.
- N. The Equipment Shop Drawings should be furnished to the installing Contractor by the purchasing Contractor before roughing in. Contractor shall not install any piping or ductwork for said equipment until he has received approved shop drawings for same.

3.03 ALTERATIONS IN PRESENT BUILDING AND SYSTEMS

- A. Contractor shall take particular note of the revisions and alterations to the existing systems, facilities and equipment due to the new construction as indicated on the Drawings and/or in Specification. Contractor shall remove, reroute or alter all services, ductwork, etc., as required or as indicated on the drawings.
- B. The Contractor shall maintain all services in the existing building. In case, where new service connections are to be made to existing services and service interruptions can in no way be avoided, the service interruptions shall be with the minimum of inconvenience to the Owner and the work shall be done at such time of any day, Saturday and Sunday included, and only as directed by the Owner or the Architect.

3.04 ACCESSIBILITY

- A. Do not locate traps, valves, controls, unions, cleanouts, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in plumbing systems.

3.05 ACCESS PANELS

- A. Refer to Division 08 - Openings; Provide access doors in locations as required by applicable codes and as indicated below. Coordinate locations with architectural trades.
- B. Submit shop drawings for review before ordering panels. Where fire rating is required, furnish label doors compatible with fire rating of assembly.
- C. Contractor shall confer with other trades with respect to access panel locations, and shall wherever practical group valves, traps, dampers, etc. in such way as to be accessible from single panel and eliminate as many access panels as possible.
- D. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- E. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed. Hinges shall be concealed type. Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials.

3.06 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Contractor shall furnish and install sheet metal drain pans beneath piping that is routed above electrical equipment and/or above the 3' access space in front of such equipment. Electrical equipment, for the purpose of addressing drain pan requirements, shall be defined as free-standing or wall-mounted switchgear, transformers, distribution boards or motor control centers.

1. Drain pans shall be 20 gauge galvanized sheet metal with a minimum 4" high turned up edge. Bottom of drain pan shall slope to a single drainage point at $\frac{1}{8}$ " per foot. A 1" diameter clear plastic tube shall allow collected fluid to drain to the nearest open site floor drain. Secure plastic tubing to building structure only.
 2. Drain pan shall be hung from building structure with angle iron trapeze hangers (no hanger shall penetrate the drain pan). Consider drain pan to be full of water for hanger load calculations.
 3. Drain pans shall include liquid detectors with alarms only if noted on the drawings. Liquid detectors shall be specified in Section 22 10 06 Plumbing Piping Specialties.
- B. Contractor shall include provisions to adjust the local lighting layout, at no extra cost to Owner, in order to accommodate any detrimental effect the drain pan has on the illumination of the electrical equipment and access space.

3.07 CUTTING PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to Division 01 - General Requirements.
- B. All cutting required shall be done by the contractor whose work is involved, without extra cost the owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the architect patched by the respective, responsible contractor.
- C. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

3.0 EXCAVATION AND BACKFILLING

- A. Provide all excavation, trenching, tunneling, removal of materials, de-watering and backfilling required for the proper laying of pipes and plumbing work. Coordinate the work with other excavating and backfilling in same area.

3.09 ROUGH-IN FOR CONNECTION TO EQUIPMENT

- A. It shall be the responsibility of each contractor to study the architectural, structural, electrical, and mechanical drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

3.10 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and of the best quality used for the purpose in good commercial practice, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

3.11 SEAL PENETRATIONS

- A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

3.12 SOUND CONTROL

- A. Penetrations shall be maintained airtight to prevent sound transfer.
- B. Piping shall pass through sleeves. Pack sleeves tight with glass fiber or oakum and caulked on both sides with non-hardening acoustical sealant.

3.13 FIRESTOPPING

- A. Refer to Division 07 - Thermal and Moisture Protection for more information.
- B. Provide UL classified firestopping system for plumbing penetrations through rated walls and floors to maintain the fire rating.

3.14 CONTROL WIRING

- A. All control wiring for plumbing and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded and the operating contacts in the north side of the circuit. All control wiring shall be installed in conduit.

3.15 CLEANING FLUSHING AND INSPECTING

- A. Refer to Division 01 - General Requirements; all plumbing equipment and components shall be cleaned as frequently as necessary through the construction process and again prior to project completion.
- B. Clean exterior surfaces of installed piping systems of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.
- C. Sufficient flushing water shall be introduced into the mains to produce a velocity of not less than 4' per second and this flow rate shall be continued until the discharge is clean and clear and does not show evidences of silt or foreign matter when a sample is visually inspected.
- D. Inspect pressure piping in accordance with procedures of ASME B31.

3.16 DELIVER □ STORAGE AND PROTECTION OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; all equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager/General Contractor and be performed in a manner as to avoid damage, deterioration and loss.
- C. Contractor shall provide temporary protection for installed equipment prior to project completion.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. All equipment shall be inspected prior to installation to assure that equipment is free from defect and damage.
- F. Protect plumbing fixtures and piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.17 PIPING TESTS

- A. Test pressure piping in accordance with ASME B31.
- B. General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.
 - 1. Test each piping system at 150% of operating pressure, or other pressure as required by Authority Having Jurisdiction, whichever is greater.
 - a. Domestic water systems and equipment vents shall be tested hydrostatically for minimum of four hours at 1 □ times design pressure for that system, or 100 psig minimum, whichever is greater, unless otherwise specified.
 - b. Storm, soil, waste and vent piping shall be tested with water for minimum of 24 hours at 10 feet head.
 - c. Acid resistant waste and vent systems shall be tested as per manufacturer's recommendations.
 - 2. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.
- C. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics or other temporary repair methods.
- D. Drain test water from piping systems after testing and repair work has been completed.

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Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

**SECTION 22 0505
SELECTIVE DEMOLITION FOR PLUMBING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition and extension of existing plumbing work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.

1.03 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the system of minor electrical demolition as described in this specification.
- B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.
- C. It is the contractor's obligation to become familiar with the extent of demolition and the existing condition before submitting their bid.
- D. During demolition if the contractor discovers unforeseen significant non-code compliance conditions of the existing installation they shall notify the Architect and Engineer immediately in writing.
- E. The contractor shall become familiar with the drawings and scope of work of other trades as the work scope of those trades relates to mechanical equipment and connection requirements.
- F. During demolition the contractor shall record on site as-builts all plumbing sanitary, waste and domestic hot, cold and hot water recirculation capped branches for reuse in renovated project space.

PART 2 PRODUCTS

2.01 MATERIALS

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping to be demolished serve only equipment and facilities within the demolition areas.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Identify locations for capping plumbing piping before any demolition work commences.
- B. Coordinate utility service shut-downs with Utility Companies.
- C. Provide temporary connections to maintain existing systems in service during construction.
- D. Confirm isolation valve locations for domestic water piping. Repair leaking isolation valves or replace inoperable valves before commencing piping demolition.

3.03 DEMOLITION AND EXTENSION OF EXISTING PLUMBING WORK

- A. In general plumbing remodeling work is shown on Drawings but carefully study all drawings for all contracts for "demolition" and "remodeling" work in existing building and field check to verify locations where such work is being done to determine exact extent of work required. No extra will be allowed for additional work required because of demolition or remodeling whether or not work is specifically noted, itemized or shown on Drawings.
- B. Remove existing equipment and materials pertaining to contract as specified or as required, whether shown on Drawings or not, to prepare for new work of all contracts.
- C. Where necessary, reroute piping, ducts, etc. from within walls, floors, ceilings, etc. being removed. Contractor involved with interrupted service shall be responsible for accomplishing required work whether shown on Drawings or not.
- D. Remove, relocate, and extend existing plumbing piping to accommodate new construction.
- E. Remove domestic water piping back to main and provide isolation valve and cap. DEAD LEGS ARE NOT ALLOWED.
- F. Remove sanitary and waste piping to branch connection fitting to negate any dead legs.

3.04 CLEANING AND REPAIR

- A. Refer to Division 01 - General Requirements for procedures.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.

**SECTION 22 0519
METERS AND GAUGES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gauges.
- B. Thermometers.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2022.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014 (Reapproved 2020).
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014 (Reapproved 2021).
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide red-marked product data sheets for each furnished item with associated components and accessories.
- C. 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 Pressure Gauges: One of each type and size.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

- A. Manufacturers:
 - 1. Ashcroft, Inc: www.ashcroft.com/#sle.
 - 2. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
 - 3. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
 - 4. Omega Engineering a subsidiary of Spectris, Plc: www.omega.com/#sle.
 - 5. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Bourdon Tube for Liquids and Gases:
 - 1. Dial Size and Cover: 4-1/2 inch diameter scale with polycarbonate window.
 - 2. Dial Text and Markings: Black color on white background with scaled kPa and psi units.
 - 3. Accuracy: ASME B40.100, adjustable commercial grade (D) with 5 percent of span.
 - 4. Process Connection: Lower-back, 1/4 inch NPT male except where noted.
- C. Accessories:
 - 1. Gauge Cock: Carbon steel with tee or lever handle for maximum 150 psi.

2.02 THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
 - 2. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
 - 3. Watts Water Technologies, Inc: www.watts.com/#sle.
 - 4. Weiss Instruments, LLC: www.weissinstruments.com/#sle.
 - 5. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. General:
 - 1. Product Compliance: ASTM E1.

2. Lens: Clear glass, except where stated.
 3. Accuracy: One percent, when tested in accordance with ASTM E77, except where stated.
 4. Scale: Black markings depicting single scale in degrees F where expected process value falls half-span of standard temperature range.
- C. Thermometers - Adjustable Angle: 7 inch v-shape aluminum case with clear glass window scale, 6 inch NPT stem, red or blue organic non-toxic liquid filled glass tube, and adjustable joint with positive locking device allowing 360 degrees in horizontal plane or 180 degrees in vertical plane adjustments.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports, and test plugs.

3.02 INSTALLATION

- A. Install metering products in accordance with manufacturer's instructions for intended fluid type and service.
- B. Install pressure gauges as follows:
1. At Pumps: Place single gauge before strainer, suction side and discharge side.
 2. Include gauge cock to isolate each gauge and extend nipples for insulation clearance.
 3. Adjust gauges to selected viewing angle, clean thoroughly, and calibrate to zero.
- C. Install thermometers as follows:
1. Water Heaters: Place upstream and downstream of heater. Add one on the inlet end when using steam as the water heating medium.
 2. Piping, where indicated on details or plans: Install thermometers in branch butt weld connection fitting or socket-weld thermowell. Enlarge pipes smaller than 2-1/2 inch to accommodate sockets. Ensure sockets are above insulation clearance.

3.03 SCHEDULES

- A. Pressure Gauges, Location and Scale Range:
1. Pumps, 0 to 100 psi.
 2. Expansion tanks, 0 to 80 psi.
 3. Pressure reducing valves, 0 to 120 psi.
- B. Stem Type Thermometers, Location and Scale Range:
1. Domestic hot water supply and recirculation, 0 to 180 degrees F.

SECTION 22 0523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ball valves.
- B. Check valves.
- C. Manual balancing valves.
- D. Drain valves.
- E. Relief valves.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels.
- B. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- C. Section 22 0719 - Plumbing Piping Insulation.
- D. Section 22 1005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. PTFE: Polytetrafluoroethylene.
- E. TFE: Tetrafluoroethylene.
- F. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

- A. ASTM F-2389-07 Standard Specification for Pressure-rated Polypropylene (PP) Piping.
- B. CSA B137.11 Polypropylene (PP-R) Pipe and Fittings for Pressure Applications.
- C. DIN-DVS 2207-112017 Welding Thermoplastic materials – Heated element welding of pipes, piping parts, and panels made of polypropylene.
- D. ASME B1.20.1 - Pipe Threads, General Purpose, Inch; 2013 (Reaffirmed 2018).
- E. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.
- F. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard; 2020.
- G. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves; 2022.
- H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- I. ASME B16.34 - Valves — Flanged, Threaded, and Welding End; 2020.
- J. ASME B31.9 - Building Services Piping; 2020.
- K. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2023.
- L. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2023).
- M. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.
- N. AWWA C606 - Grooved and Shouldered Joints; 2022.
- O. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends; 2018.
- P. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves; 2019.

- Q. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .
- R. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- S. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Grooved joint valves shall be referred to on drawings and product submittals, and be identified by the manufacturer's listed model or series designation.

1.06 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- C. Grooved end valves shall be of the same manufacturer as the adjoining couplings.
- D. All castings used for valve bodies shall be date stamped for quality assurance and traceability.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).
- B. Provide the following valves for the applications if not indicated on drawings:
 - 1. Shutoff: Ball or butterfly.
 - a. Gate valves shall only be used on shut off for pumped sanitary/storm piping only.
 - 2. Dead-End: Single-flange butterfly (lug) type.
 - 3. Swing Check:
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - 4. Spring Loaded Check: At pump discharge.
 - 5. Manual Balancing Valves: At hot water return pump discharge only.
- C. Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.
- D. Domestic, Hot and Cold Water Valves:
 - 1. 2 inch and Smaller:
 - a. Ball: Two piece, full port, bronze with bronze or stainless steel trim.
 - 1) Hot Forged brass valves by Bonomi are allowed as specified below. Only ASTM C28500 alloy allowed.
 - b. Bronze Swing Check: Class 125, bronze disc.
 - c. Bronze or Hot Forged Brass Spring Loaded Check: Class 125, nonmetallic disc

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:
 - 1. Hand Lever: Quarter-turn valves 6 NPS and smaller.

- D. Insulated Piping Valves: With 2 inch stem extensions and the following features:
 - 1. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 2. Butterfly Valves: Extended neck.
 - 3. Memory Stops: Fully adjustable after insulation is installed.
- E. Valve-End Connections:
 - 1. Threaded End Valves: ASME B1.20.1.
 - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 - 3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
 - 4. Solder Joint Connections: ASME B16.18.
 - 5. Grooved End Connections: Copper-tube dimensions, similar to AWWA C606.
- F. General ASME Compliance:
 - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 - 2. Solder-joint Connections: ASME B16.18.
 - 3. Building Services Piping Valves: ASME B31.9.
- G. Potable Water Use:
 - 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 - 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- H. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, BALL VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Two Piece, Full Port with Bronze or Stainless Steel Trim:
 - 1. Comply with MSS SP-110.
 - 2. WSP Rating: 150 psi.
 - 3. CWP Rating: 600-1000 psig.
 - 4. Body: Lead Free Bronze.
 - 5. Ends Connections: Pipe thread or solder.
 - 6. Seats: PTFE or TFE.
 - 7. Operator: Provide stem extension.
 - 8. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle. BRONZE VALVES ONLY
 - b. Nibco: www.nibco.com BRONZE VALVES ONLY
 - c. ASC Engineered Solutions www.asc-es.com
 - d. Bonomi www.bonominorthamerica.com Lead Free Hot Forged Brass Ball Valves are allowed; only ASTM C28500 alloy is permitted.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. High Performance Ball Valves (up to 2"), Two Piece, Full Port with Stainless Steel Trim:
 - 1. Comply with MSS SP-110/145
 - 2. WSP Rating: 150 psi.
 - 3. CWP Rating: 1,000 psi.
 - 4. Body: Bronze.
 - 5. End connections: Pipe thread, solder or press.
 - 6. Seats: Reinforced PTFE
 - 7. Operator: Reversible handle.
 - 8. Manufacturers:
 - a. Nibco: www.nibco.com

2.04 BRONZE, SWING CHECK VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating: 200 psig (1380 kPa).
 - 1. Comply with MSS SP-139, Type 3.
 - 2. Design: Y-pattern, horizontal or vertical flow.
 - 3. Body: Bronze, ASTM B62.
 - 4. Ends: Threaded or soldered as indicated.
 - 5. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Jomar Valves, a division of Jomar Group: www.jomarvalve.com/#sle.
 - c. Milwaukee: www.milwaukeevalve.com.
 - d. Kitz: www.kitz-kca.com
 - e. Nibco: www.nibco.com
 - f. Substitutions: See Section 01 6000 - Product Requirements.

2.05 BRONZE SPRING LOADED CHECK VALVES

- A. Class 125: CWP Rating 200 psig (1380 kPa).
 - 1. Design: Vertical flow.
 - 2. Body: Bronze, ASTM B61 or ASTM B62
 - 3. Spring: Bronze
 - 4. Ends: Threaded or soldered as indicated.
 - 5. Disc: Nonmetallic
 - 6. Manufacturers:
 - a. Milwaukee: www.milwaukeevalve.com
 - b. Apollo Valves[<>]: www.apollovalves.com/#sle.
 - c. Bonomi: www.bonominorthamerica.com; Hot Forged Brass Material approved
 - d. Substitutions: See Section 01 6000-Product Requirements.

2.06 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

- A. Class 125 with Lever and Spring-Closure Control.
 - 1. Comply with MSS SP-71, Type I.
 - 2. Description:
 - a. CWP Rating: 200 psi.
 - b. Design: Clear or full waterway.
 - c. Body: ASTM A126, gray iron or ductile iron with bolted bonnet.
 - d. Ends: Flanged or threaded as indicated.
 - e. Spring: Stainless steel.
 - f. Trim: Bronze or stainless steel.
 - g. Gasket: Asbestos free.
 - h. Closer Control: Factory installed, exterior lever, and spring.
 - 3. Manufacturers:
 - a. Apollo Valves: www.apollovalves.com/#sle.
 - b. Flomatic Valves: www.flomatic.com/#sle.
 - c. Nibco: www.nibcoc.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.07 MANUAL BALANCING VALVES

- A. Construction: Class 125, Lead free brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain, calibrated nameplate with memory stop.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.
- C. Manufacturers:

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1. ITT Bell & Gossett: www.bellgossett.com/#sle.
2. Jomar Valve: www.jomarvalve.com
3. Caleffi; www.caleffi.com
4. Nibco: www.nibco.com
5. Gruvlok by ASC Engineered Solutions www.asc-es.com
6. Substitutions: See Section 01 6000 - Product Requirements.

2.08 DRAIN VALVES

- A. Drain Valve with hose thread and chain and dust cap; chrome plated ball, blow-out-proof stem, and adjustable packing gland.
- B. Manufacturers:
 1. Hammond: www.hammondvalve.com
 2. Apollo valves: www.apollovalves.com
 3. Bonomi www.bonominorthamerica.com
 4. Nibco: www.nibco.com/valves
 5. Milwaukee: www.milwaukeevalve.com
 6. Jomar: www.jomarvalve.com
 7. Substitutions: See Section 01 6000 - Product Requirements.

2.09 RELIEF VALVES

- A. Pressure Relief Valves: Bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.
- B. Manufacturers:
 1. CASH (A.W.) Valve Manufacturing Corp: www.cashvalve.net
 2. Zurn Industries; Wilkins-Regulator Division: www.zurn.com
 3. Watts Regulator Company: www.wattsregulator.com
 4. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- D. Provide access where valves and fittings are not exposed.
- E. Install check valves where necessary to maintain direction of flow as follows:
 1. Spring Loaded Check: Install with stem plumb and vertical.
 2. Swing Check: Install horizontal maintaining hinge pin level.
- F. Install valves with stems upright or horizontal, not inverted.

SECTION 22 0553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Underground warning tape.

1.02 RELATED REQUIREMENTS

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

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Nameplates:
 - 1. Heat exchangers, water heaters, and other heat transfer products.
 - 2. Control panels, transducers, and other related control equipment products.
 - 3. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.
- B. Tags:
 - 1. Piping: 3/4 inch diameter and smaller.
 - 2. Manual operated valves and automated control valves.
- C. Pipe Markers: 3/4 inch diameter and higher.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Engraved piece with up to three lines of text.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
 - 4. Nameplate Material:
 - a. Flexible: Polycarbonate with adhesive backing per ASTM D709.
 - b. Metal: Brass with adhesive backing.

2.03 TAGS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 4. Seton Identification Products: www.seton.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

- B. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
- C. Piping: 3/4 inch diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/#sle.
 - 2. Brimar Industries, Inc: www.pipemarker.com/#sle.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 4. Seton Identification Products: www.seton.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- D. Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.
- E. Identification Scheme, ASME A13.1:
 - 1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 - 2. Secondary: Color scheme per fluid service.
 - a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
 - 3. Tertiary: Other Details.
 - a. Directional flow arrow.

2.05 UNDERGROUND WARNING TAPE

- A. Manufacturers:
 - 1. Brady Corporation: www.bradyid.com/#sle.
 - 2. Brimar Industries, Inc: www.brimar.com/#sle.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 4. Seton Identification Products: www.seton.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, 0.005 inch, unless otherwise required for proper detection.
- D. Legend: Type of service, continuously repeated over full length of tape.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
 - 1. Install in clear view and align with axis of piping.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Apply ASME A13.1 Pipe Marking Rules:
 - 1. Place pipe marker adjacent to changes in direction.

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2. Place pipe marker adjacent each valve port and flange end.
3. Place pipe marker at both sides of floor and wall penetrations.
4. Place pipe marker every 25 to 50 feet interval of straight run.

**SECTION 22 0719
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible elastomeric cellular insulation.
- B. Glass fiber insulation.
- C. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2019, with Editorial Revision (2023).
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2019).
- C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- D. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.
- E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- H. 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.

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 INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville Corporation: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- 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. 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.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.
 - 1. Vapor Barrier Lap Adhesive shall be compatible with the insulation and as recommended by the insulation manufacturer.
- F. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- G. Indoor Vapor Barrier Finish:
 - 1. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
 - 2. Armacell LLC: www.armacell.us/#sle.
 - 3. K-Flex USA LLC: www.kflexusa.com/#sle.
 - 4. 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. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.04 JACKETING AND ACCESSORIES

- A. PVC Plastic Jacket:
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Proto Corporation: www.protocorporation.com.
 - c. 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: 0.02 per inch (0.029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil, 0.010 inch.
 - e. Connections: Brush on welding adhesive.
 - 3. Covering Adhesive Mastic: Compatible with insulation.

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. 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.
- G. 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.
- H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- J. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil, 0.001 inch thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.03 SCHEDULES

- A. Plumbing Systems:
1. Domestic Hot Water Supply & Recirculation:
 - a. Pipe Size Range: 1/2 to 1-1/4 inch
 - 1) Thickness: 1 inch
 - b. Pipe Size Range: 1-1/2 to 8 inch
 - 1) Thickness: 1-1/2 inch
 2. Domestic Cold Water: 1 inch thick.
 3. Plumbing Vents Within 10 Feet of the Exterior: 1/2 inch thick with PVC jacket.
- B. Cooling Systems:
1. Condensate Drains from Cooling Coils: 1 inch thick.

**SECTION 22 1005
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, above grade.
- D. Condensate drains.
- E. Pipe flanges, unions, and couplings.
- F. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

- A. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- B. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- C. Section 22 0719 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2021.
- C. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.
- D. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.
- E. ASME B31.9 - Building Services Piping; 2020.
- F. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2021.
- G. ASTM B32 - Standard Specification for Solder Metal; 2020.
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2020.
- J. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.
- K. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- L. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- M. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.
- N. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.
- O. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020.
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- Q. AWWA C651 - Disinfecting Water Mains; 2014, with Addendum (2020).
- R. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2021.
- S. 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; 2020.

- T. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).
- U. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- V. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- W. 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 data on pipe materials, pipe fittings, and accessories. Provide manufacturers catalog information.
 - 1. Grooved joint couplings and fittings shall be referred to on drawings and product submittals, and be identified by the manufacturer's listed model or series designation.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- C. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - 1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. 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.

1.08 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing plumbing piping systems with the following minimum working-pressure ratings:
 - 1. Hot-Water Piping: 80 psig at 140 deg. F
 - 2. Hot-Water Return Piping: 80 psig at 140 deg. F
 - 3. Cold-Water Piping: 80 psig at 75 deg. F

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.
- B. Plenum-Installed Acid Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests.

2.02 SANITARY WASTE 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 & Fittings: CISPI 301, ASTM A 888 hubless.
 - 1. Tensile Strength: 21,000 psig minimum.

2. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.
 3. Each length of pipe and each fitting shall be plainly marked with size, country of origin, and name of manufacturer, or manufacturer's registered trademark by which the manufacturer can be readily identified after installation.
 4. Heavy-Duty, Hubless-Piping Couplings:
 - a. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:
 - 1) Ideal Tridon
 - 2) ANACO-Husky
 - 3) Tyler Couplings
 - 4) Mission Rubber Company
 - b. Standards: ASTM C 1540.
 - c. Description: Shield Assemblies shall consist of stainless-steel bi-directional corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Copper Tube: ASTM B306, DWV.
1. Fittings: ASME B16.23, cast copper, or ASME B16.29, wrought copper.
 2. Joints: ASTM B32, alloy Sn50 solder.
- D. PVC Pipe:
1. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
 2. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
 3. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40 **will not be accepted**.
 4. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns.
 5. PVC Pressure Fittings: ASTM D 2466, Socket Type
 6. Primer: ASTM F 656.
 - a. Primer shall have a VOC content of 550g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)
 - b. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers"
 7. Solvent Cement: ASTM D 2564.
 - a. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)
 - b. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers"

2.03 SANITARY WASTE PIPING, ABOVE GRADE

- A. Cast Iron Pipe & Fittings: CISPI 301, ASTM A 888 hubless.
1. Fittings: Cast iron.
 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
 3. Tensile Strength: 21,000 psig minimum.
 4. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF International.
 5. Each length of pipe and each fitting shall be plainly marked with size, country of origin, and name of manufacturer, or manufacturer's registered trademark by which the manufacturer can be readily identified after installation.
 6. CISPI, Hubless-Piping Couplings:

- a. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:
 - 1) Ideal Tridon
 - 2) ANACO-Husky
 - 3) Tyler Couplings
 - 4) Mission Rubber Company
 - b. Standards: ASTM C 1277 and CISPI 310.
 - c. Description: Shield Assemblies shall consist of stainless-steel bi-directional corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop. Couplings shall bear the trademark NSF International.
- B. Copper Tube: ASTM B306, DWV.
1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, solvent.
 2. Joints: ASTM B32, alloy Sn50 solder.

2.04 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88 (ASTM B88M), Type L (B) or K (A), Drawn (H). Type M (C) will not be accepted.
1. Fittings:
 - a. ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - b. Grooved end fittings manufactured to copper-tube dimensions. (Flaring of tube or fitting ends to accommodate alternate sized couplings is not permitted.)
 2. Joints:
 - a. ASTM B32, solder.
 - b. Grooved joint coupling consisting of two ductile iron housings cast with offsetting angle-pattern bolt pads, Fluoroelastomer center-leg gasket with pipe stop to ensure proper groove engagement, alignment, and pipe insertion depth, and ASTM A449 compliant bolts and nuts. Installation ready rigid coupling for direct stab installation without field disassembly.
 - 1) UL classified in accordance with NSF-61 for potable water service. The system shall meet the low-lead requirements of NSF-372.
 3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Apollo Valves: www.apollovalves.com/#sle.
 - 2) Nibco: www.nibco.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.

2.05 CONDENSATE DRAINS SERVING INDIVIDUAL EQUIPMENT

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
1. Solder joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.06 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 inch 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 Sizes 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. Unions or flanges for servicing and disconnect are not required in installations using grooved joint couplings.

- D. No-Hub Couplings:
 - 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 - 2. General: Comply with ASTM C1277 and CISPI 310.
 - 3. Gasket Material: Neoprene complying with ASTM C564.
 - 4. Band Material: Stainless steel complying with ASTM A240.
 - 5. Eyelet Material: Stainless steel.
 - 6. Manufacturers:
 - a. MIFAB, Inc: www.mifab.com/#sle.
 - b. Anaco-Husky: www.anaco-husky.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- E. Dielectric Connections:
 - 1. Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
 - 2. Waterway Fitting: Copper-silicon casting conforming to UNS C87850, and UL classified in accordance with ANSI / NSF-61 for potable water service. Fittings shall have threaded ends, grooved ends, or a combination.

2.07 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.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp. Riser clamps shall be isolated from the building structure by placing felt or rubber pads between the clamp and the structure.
- B. Pipe Stands on Rooftops
 - 1. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
 - 2. High-Type, Single-Pipe Stand:
 - a. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration
 - b. Base: Plastic or Stainless Steel
 - c. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - d. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
 - 3. High-Type, Multiple-Pipe Stand:
 - a. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 - b. Bases: One or more; plastic.
 - c. Vertical Members: Two or more protective-coated-steel channels.
 - d. Horizontal Member: Protective-coated-steel channel.
 - e. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

PART 3 EXECUTION

3.01 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, grooved joint couplings, or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Cast iron soil pipe installed in accordance to CISPI's Handbook.

- B. Install aboveground PVC piping according to ASTM D 2665.
- C. Install underground PVC piping according to ASTM D 2321.
- D. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- E. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- F. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- G. Group piping whenever practical at common elevations.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access door with Division 01.
- K. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover.
- L. Provide support for utility meters in accordance with requirements of utility companies.
- M. Install valves with stems upright or horizontal, not inverted. See Section 22 0523.
- N. Install water piping to ASME B31.9.
- O. Slope water piping and arrange to drain at low points.
- P. 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.
- Q. Grooved joints shall be installed in accordance with the manufacturer's latest published instructions. 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. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. 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 periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products.
- R. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- S. Sleeve pipes passing through partitions, walls, and floors.
- T. Pipe Stand Installation: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
- U. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- V. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
 - 3. Install lateral bracing with pipe hangers and supports to prevent swaying.
 - 4. Provide copper plated hangers and supports for copper piping.
- W. Pipe 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.
- X. 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, union, and couplings for servicing are consistently provided.
- Y. In general, all piping, and similar items shall be installed concealed from view above ceiling, in partitions, shafts, chases, unless otherwise indicated.
- Z. Where pipes are in partitions, furred out spaces and chases, obtain information as to their exact location and size and install work so as to be entirely concealed in allotted space. If conflicts arise making this impossible, obtain instructions from Architect/Engineer before proceeding with work.
- AA. Where there is evidence that plumbing work will interfere with other work, assist in working out space conditions and/or structure, make necessary adjustments to accommodate work.
- BB. Plumbing work installed before coordinating with other work so as to cause interference with other work to be changed to correct such condition without additional cost to Owner.
- CC. Appliances and equipment to be installed and connected with best engineering practices and in accordance with manufacturer's instructions and recommendations. Piping, valves, connections and other like items recommended by manufacturer or as required for proper operation to be provided without additional cost to Owner.
- DD. In no case will any pipe, conduit or duct be installed where it is supported on or suspended from another pipe, conduit or duct.

3.03 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.
- C. Provide flow controls in water recirculating systems where indicated.

3.04 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope; 1/4 inch per foot slope for piping serving low flow fixtures.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. 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).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

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- H. 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.

3.06 SERVICE CONNECTIONS

- A. Provide new natural gas service if required by utility provider. Coordinate incoming line size, meter location, regulator settings, etc. with Utility Company prior to the start of any work.

**SECTION 22 1006
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleanouts.
- B. Strainers.
- C. Pump connectors.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 3000 - Plumbing Equipment.
- C. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- B. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- C. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, and other specialties applicable to project.
- D. 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 Loose Keys for Outside Hose Bibbs: One.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. MIFAB, Inc: www.mifab.com/#sle.
 - 4. Zurn Industries, LLC: www.zurn.com/#sle.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cleanouts at Exterior Surfaced Areas
 - 1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Exterior Unsurfaced Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- D. Cleanouts at Interior Finished Floor Areas:
 - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- E. Cleanouts at Interior Finished Wall Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

- F. Cleanouts at Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.03 STRAINERS

- A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com
 2. Green Country Filter Manufacturing: www.greencountryfilter.com
 3. WEAMCO: www.weamco.com
 4. Legend: www.legendvalve.com
 5. Substitutions: See Section 01 6000-Product Requirements.
- B. Size 2 inches and Under:
1. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen. Lead free.
- C. Size 1-1/2 inch to 4 inches:
1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen. Lead free.
- D. Size 5 inch and Larger:
1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen. Lead free.

2.04 WATER HAMMER ARRESTORS

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 3. Zurn Industries, LLC: www.zurn.com/#sle.
 4. Sioux Chief: www.siouxchief.com
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Water Hammer Arrestors:
1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 33 to 180 degrees F and maximum 125 psi working pressure.

2.05 MIXING VALVES

- A. Thermostatic Mixing Valves:
1. Manufacturers:
 - a. Acorn Controls: www.acorncontrolvalves.com
 - b. Powers: www.powerscontrols.com.
 - c. Caleffi; www.caleffi.com/usa/en-us
 - d. Watts: www.watts.com
 - e. Zurn: www.zurn.com
 - f. Substitutions: See Section 01 6000 - Product Requirements.
 2. Point of Use Mixing Valve:
 - a. The Thermostatic Mixing Valve shall be IAPMO lab certified to ASSE 1069, ASSE 1070 and CSA B125.3 standards and capable of meeting the control accuracy requirements of these standards at the manufacturer's listed minimum flow rates.
 - b. Valve shall have an adjustable outlet temperature range of 90°F-115°F (32°C-46°C), factory set at 105°F (41°C).
 - c. Valve shall be a solid brass body with a capacity of 12 GPM (45 LPM) at 45 PSI (310 kPa) differential and a maximum operating pressure of 125 PSIG (862 kPa). Supply pressure variation shall be up to 20%.
 - d. Valve shall contain a copper encapsulated, paraffin-based thermal actuator.

2.06 PUMP CONNECTORS

- A. Manufacturers:
 - 1. Twin City Hose: www.twincityhose.com
 - 2. Metraflex: www.metraflex.com
 - 3. FlexHose: www.flexhose.com
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flexible Connectors: Braided type with wetted components or stainless steel or bronze, sized to match piping. Materials of construction shall be consistent with pipe material and equipment/pipe connection fittings. Flexible hose connectors shall be capable of compensating for lateral movement and vibrations.
- C. NSF 61 listed for potable water use.
- D. End connections: Same as specified for pipe jointing. Copper fittings shall not be attached to stainless steel hose.

2.07 AIR VENTS

- A. Manufacturers:
 - 1. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com/#sle.
 - 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 - 3. Taco, Inc: www.taco-hvac.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate clean-out locations with Architect prior to installation.
- C. Provide air vents at high points in the system and as indicated on plans or details. Provide at least one air vent in mechanical rooms on all domestic water piping services.
- D. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- E. Encase exterior cleanouts in concrete flush with grade.
- F. Install floor cleanouts at elevation to accommodate finished floor.
- G. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- H. Pipe relief from backflow preventer to nearest drain.
- I. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to fixtures or devices with quick closing valves; to include flushvalves, dishwashers, washing machines, etc. All branches serving flushvalves shall be provided with water hammer arrestors installed in compliance with manufacturer recommendations.

**SECTION 22 1123
DOMESTIC WATER PUMPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Circulators.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. ICC (IPC) - International Plumbing Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide certified pump curve with duty point marked over pump and system operating conditions and NPSH curve and power requirement by pump tag.
 - 2. Manufacturer's catalog sheets for fixtures, fittings, accessories, and supplies.
- C. Shop Drawings: Include dimensions and performance data.
- D. Test Reports: Plumbing fixture operational tests.

1.05 QUALITY ASSURANCE

- A. Certifications: Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc, as suitable for purpose specified and indicated.
- B. Identification: Provide pumps with manufacturer's name, model number, and rated capacity identified by permanently attached label.
- C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 1-year manufacturer warranty for pumps except circulator type. Complete forms in Owner's name and register with manufacturer.
- C. Manufacturer Warranty: Provide 5-year manufacturer warranty for circulators. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 CIRCULATORS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com/#sle.
 - 2. Bell & Gossett, a Brand of Xylem, Inc: www.xylem.com/#sle.
 - 3. Grundfos Pumps Corporation: www.grundfos.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wet Rotor Inline Pump:
 - 1. Basis of Design: B&F NBF
 - 2. The pump shall be of the horizontal system lubricated type specifically designed and guaranteed for quiet operation.

3. Pump to be suitable for 225 degrees F (107 degrees C) operation at 150 psig working pressure.
 4. The pump shall have a ceramic shaft supported by carbon bearings. Bearings are to be lubricated by the circulating fluid.
 5. Pump body shall be lead-free bronze.
 6. Motor stator to be isolated from circulating fluid through use of stainless steel can. Rotor to be sheathed in stainless steel.
 7. Motors shall be non-overloading at any point on the pump curve. Motors shall have built-in thermal protection or impedance protection.
 8. Accessories:
 - a. Check valve
 - b. Automatic timer kit - to turn pump on and off automatically at preset times.
 - c. Aquastat kit - to thermostatically turn on pump on at 100 degrees F and off at 120 degrees F.
- C. Performance: Refer to Schedules.
- D. Notify engineer upon start-up and commissioning of pumps to ensure proper setpoints are used.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products with related fittings, and accessories according to manufacturer instructions.
- B. Provide for the service of a competent factory-trained supervising agent from the equipment manufacturer to inspect the completed installation, start the system and acquaint the operators with the proper operation and maintenance of the equipment.
- C. Potable and Drinking Water Service: Provide NSF 61 certified; comply with ICC (IPC).
- D. Electrical-Driven Pump Work:
 1. Provide electric-motor-driven equipment specified complete with local disconnect switch and control panel with starter, controls, safety devices, and related wiring.
 2. Provide automatic control and protective devices field-wired to interface-related devices required for specified operation.
- E. Ensure that small pressure gauges are installed on both upstream and downstream ends.
- F. Hot Water Service: Ensure that small pressure-temperature gauges are installed on both upstream and downstream ends.
- G. Factory-Provided Pump Controls: Factory provided, tested for use.
- H. ECM, VSD, or VFD Controlled Motors: Configure unit to operate within manufacturer-listed pump curve points unless factory set to do so. Then adjust to operate in automatic to maintain downstream pressure setpoint.
- I. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are nonoverloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- J. Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.
- K. Provide temperature and pressure gauges where and as detailed or directed.
- L. All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any load or stress being applied to the connections or piping.
- M. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instruction and per applicable state, federal, and local codes.
- N. Control wiring for remote mounted switches and sensor / transmitters shall be the responsibility of the control's contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal, and local codes.
- O. Power and control wiring shall run in separate channel.

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- P. Pumps that are supplied with an integrated VFD and should not be used with any external VFDs.
- Q. Pumps shall NOT be run dry to check rotation.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements for additional requirements.
- B. Operational Tests: Upon completion and sterilization of plumbing systems, conduct operating tests to demonstrate satisfactory, functional, and operating efficiency.

3.03 CLEANING

- A. Thoroughly clean plumbing fixtures and equipment.

3.04 PROTECTION

- A. Protect installed products from damage due from subsequent construction operations.
- B. Repair or replace products damaged before Date of Substantial Completion.

**SECTION 22 3000
PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial gas-fired water heaters.
- B. Expansion tanks.

1.02 RELATED REQUIREMENTS

- A. Section 22 1123 - Domestic Water Pumps.
- B. Section 22 1429 - Sump Pumps.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.
- B. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less; 2019, with Errata (2020).
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2023.
- E. ICC (IPC) - International Plumbing Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Provide electrical characteristics and connection requirements.
- C. Project Record Documents: Record actual locations of components.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- 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 Water Softener Salt: 50 pounds.

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. Certifications:
 - 1. All products in contact with potable water: NSF approved.
 - 2. Indirect-Fired Gas Water Heaters: AHRI Directory of Certified Product Performance.
 - 3. Electric Water Heaters: UL listed and labeled to UL 174.
 - 4. Pressure Vessels for Heat Exchangers: ASME labeled to ASME BPVC-VIII-1.
 - 5. Water Tanks: ASME labeled to ASME BPVC-VIII-1.
 - 6. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
 2. PVI: www.pvi.com/#sle.
 3. Bradford White Corporation: www.bradfordwhite.com/#sle.
 4. Lochinvar: www.lochinvar.com/#sle.
 5. Bock: www.bockwaterheaters.com
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Performance:
1. The water heater shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 standard.
 2. The water heater's efficiency shall be verified through third party testing by AHRI and listed in the AHRI Certification Directory.
 3. Minimum hot water storage temperature shall be 140 degrees F, unless otherwise noted on Schedules.
- C. Commercial Gas-Fired Water Heaters:
1. Type: Automatic, natural gas-fired, vertical storage.
 2. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 3. Performance: Refer to Schedules.
 4. Tank: Glass-lined, welded steel, ASME labeled; multiple flue passages, 4-inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.
 - d. Anode: Magnesium.
 - e. Temperature and Pressure Relief Valve: ASME labeled.
 - f. Condensate neutralizer, as required.
 6. Applications:
 - a. Automatic storage water heater.
 7. Controls: The water heater shall feature a SMART Control with an LCD display with soft key pad. The control system shall have an electronic display for water heater set-up, water heater status, and water heater diagnostics. All electronic circuitry shall be easily accessed and serviceable from the front of the jacket.

2.02 EXPANSION TANKS

- A. Manufacturers:
1. Amtrol Inc: www.amtrol.com/#sle.
 2. Wessels: www.westank.com/#sle
 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Tank: Tank shall have a Deep-Drawn steel shell with no longitudinal welds or "T" joints. The tank shall be constructed, tested and stamped in accordance with Section VII, Division 1 of the ASME Code. All welds to conform to ASME Section IX. Tanks shall carry NSF Standard 61 and IAPMO Lead-Free listings.
- C. Diaphragm: A Butyl rubber diaphragm shall be affixed to the pressure shell via a circumferentially grooved seal.

- D. Antimicrobial Chamber: The internal water chamber shall include a molded Polypropylene liner with a silver-ion based Antimicrobial compound; tested to Standard JIS Z 2801 for efficacy in the reduction of Legionella (*L. pneumophila*), Staphylococcus (*S. aureus*) and Coliform (*E. coli*) bacteria on its surface.
- E. Connection: The water connection shall be 304L Stainless Steel with a Turbulator circulation device inserted to encourage reduction of stagnant water within the tank water chamber.
- F. Accessories: Pressure gauge and air-charging fitting, tank drain. Contractor shall field adjust pre-charge after field verification of incoming service pressure to hot water system.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.
- B. Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.
- C. Provide for the service of a competent factory-trained supervising agent from the equipment manufacturer to inspect the completed installation, start the system and acquaint the operators with the proper operation and maintenance of the equipment.
- D. Notify engineer upon start-up and commissioning of pumps to ensure proper setpoints are used.
- E. Domestic Water Storage Tanks:
 - 1. Provide steel pipe support, independent of building structural framing members.
 - 2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
- F. Floor Mounted Equipment:
 - 1. Install the system level and in accordance with manufacturer's published recommendations.
 - 2. Locate equipment with allowance for manufacturer's recommended clearances around unit.
 - 3. Set entire unit on 4" high reinforced concrete equipment pad.
 - 4. Pipe discharge from all relief valves, drains and individual pump thermal purge protection solenoid valves, indirectly to floor drain having adequate capacity to accept discharge.

**SECTION 22 4000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush valve water closets.
- B. Wall hung urinals.
- C. Lavatories.
- D. Wall-hung, solid surface, multistation lavatory units.
- E. Bi-level, electric water coolers.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Owner-furnished fixtures.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 22 1006 - Plumbing Piping Specialties.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008 (Reaffirmed 2013).
- C. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).
- D. ASME A112.18.1 - Plumbing Supply Fittings; 2018, with Errata.
- E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2018, with Errata.
- F. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2022.
- G. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2022.
- H. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices; 2020.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- J. IAPMO Z124 - Plastic Plumbing Fixtures; 2022, with Editorial Revision.
- K. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- L. NSF 372 - Drinking Water System Components - Lead Content; 2022.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- D. 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 Faucet Washers: Two sets of each type and size.
 - 3. Extra Toilet Seats: One of each type and size.
 - 4. Flush Valve Service Kits: One for each type and size.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on-site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler refrigeration system.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Perform work in accordance with local health department regulations.

2.03 FLUSH VALVE WATER CLOSETS

- A. Water Closets: Vitreous china, ASME A112.19.2, wall hung or floor mounted as indicated on Schedules, siphon jet flush action, china bolt caps.
 - 1. Flush Valve: Exposed (top spud).
 - 2. Flush Operation: Refer to Schedules.
 - 3. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Sloan: www.sloan.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Flush Valves: ASME A112.18.1, diaphragm type , complete with dual filtered by-pass, vacuum breaker stops and accessories.
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Sloan Valve Company: www.sloanvalve.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Kohler Company: www.kohler.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Exposed Type: Chrome-plated, escutcheon, integral screwdriver stop.
- C. Toilet Seats:
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Bemis Manufacturing Company: www.bemismfg.com/#sle.
 - c. Church Seat Company: www.churchseats.com/#sle.
 - d. Centoco: www.centoco.com
 - e. Zurn Industries, Inc: www.zurn.com/#sle.
 - f. Manufacturer of Closet Bowl.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.04 WALL HUNG URINALS

- A. Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Gerber Plumbing Fixtures LLC: www.gerberonline.com/#sle.
 - 3. Kohler Company: www.kohler.com/#sle.
 - 4. Zurn Industries, Inc: www.zurn.com/#sle.
 - 5. Sloan: www.sloan.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.

- B. Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
 - 1. Flush Valve: Exposed (top spud).
 - 2. Flush Operation: Refer to Schedules.
 - 3. Trapway Outlet: Integral.
- C. Flush Valves: ASME A112.18.1, diaphragm type , complete with dual filtered by-pass, vacuum breaker stops and accessories.
 - 1. Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Sloan Valve Company: www.sloanvalve.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Kohler Company[<>]: www.kohler.com/#sle.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- D. Urinal Carriers:
 - 1. Manufacturers:
 - a. Jay R. Smith MFG. Co: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Zurn Industries, Inc: www.zurn.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.05 LAVATORIES

- A. Manufacturers:
 - 1. American Standard, Inc: www.americanstandard-us.com/#sle.
 - 2. Kohler Company: www.kohler.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com/#sle.
 - 4. Sloan: www.sloan.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Vitreous China Basin: ASME A112.19.2; vitreous china wall hung or counter-top mounted as indicated on Schedules, with overflow.
- C. Supply Faucet:
 - 1. Deck Mounted Faucet Manufacturers:
 - a. American Standard, Inc: www.americanstandard-us.com/#sle.
 - b. Kohler Company: www.kohler.com/#sle.
 - c. Zurn Industries, LLC: www.zurn.com/#sle.
 - d. Symmons: www.symmons.com
 - e. Speakman: www.speakman.com
 - f. Delta Faucet: www.deltafaucet.com
 - g. Sloan: www.sloan.com
 - h. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. ASME A112.18.1; chrome plated supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gpm, ADA compliant handles.
- D. Carrier for Wall Mounted Lavatories:
 - 1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 - b. JOSAM Company: www.josam.com/#sle.
 - c. Zurn Industries, LLC: www.zurn.com/#sle.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.
 - 3. Provide carrier with integral clearance for piping as required for installation as shown on plans.

- E. Accessories:
 - 1. Offset waste with perforated open strainer.
 - 2. Lavatory P-trap shall be chrome plated cast brass adjustable ground joint swivel with cleanout, with 17- gauge seamless brass adjustable wall bend provided with deep bell flange. P-Trap to have 2" water seal and rough-in complete, adapter extensions are not allowed. P-Trap shall be certified by CSA or other recognized third-party testing authority and marked with manufacturer's name. No private label wholesale products will be allowed.
 - a. Part # McGuire 8902C
 - 3. Screwdriver stops.
 - 4. Rigid supplies.
 - 5. All exposed lavatory and sink trim on wheelchair accessible fixtures shall be covered with a seamless antimicrobial vinyl insulating outer shell. Material shall be flame retardant and fungal and bacterial resistant. Insulating kits shall include covers for, drain tailpiece, all P-Trap components, and hot/cold water supplies.
 - a. Part #McGuire PW2150WC
 - 6. Install with point of use thermostatic mixing valve. Refer to Section 22 1006.

2.06 WALL-HUNG, SOLID SURFACE, MULTISTATION LAVATORY UNITS

- A. Description: Rectilinear, level-surface deck, seamless and integral elongated basin, with stainless steel enclosed pedestal cabinet.
- B. Deck and Bowl Material: Fabricate from molded engineered stone material consisting of natural quartz, granite, and other minerals in a matrix of thermoset acrylic modified bio-based polyester resin and meeting requirements of IAPMO Z124.
- C. Surface Burning Characteristics: Smoke developed index less than 450, and flame spread index less than 25, Class A, when tested in accordance with ASTM E84.
- D. Water Supply: Thermostatic mixing valve assembly.
- E. Color: As selected by Architect from manufacturer's full line.
- F. Sensor-Operated Faucets:
 - 1. Manufacturers:
 - a. By sink manufacturer
 - b. Substitutions: See Section 01 6000-Product Requirements.
 - 2. High profile metering faucet with infrared and external temperature control.
 - 3. Vandal-resistant meeting requirements of ASME A112.18.1 and ADA Standards compliant.
 - 4. Body: Polished, chrome-plated commercial solid cast brass, with centershank.
 - 5. Tempered Water Supply: ADA Standards compliant lever on faucet body.
 - 6. Aerator: Flow rate of 0.5 gpm at 20 to 80 psi operating range.
 - 7. Sensor Module: Water conserving, vandal-resistant adjustable sensor unit with timing turn-off delay and stationary object automatic timed cutoff, with battery diagnostic light, serviceable from above deck.
- G. Access Panel: Stainless steel.
- H. Support Frame: Wall-mounted, heavy gauge, stainless steel.
- I. Manufacturers:
 - 1. Acorn Engineering Company: www.acorneng.com/#sle.
 - 2. Bradley Corporation: www.bradleycorp.com/#sle.
 - 3. Sloan: www.sloan.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.07 BI-LEVEL, ELECTRIC, FILTERED WATER COOLERS WITH BOTTLE FILLER

- A. Manufacturers:
 - 1. Elkay Manufacturing Company: www.elkay.com/#sle.

2. Haws Corporation: www.hawesco.com/#sle.
 3. Murdock Manufacturing, Inc: www.murdockmfg.com/#sle.
 4. Oasis International: www.oasiscoolers.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Water Cooler: Bi-level, electric, mechanically refrigerated; mounting as specified on Schedules , ADA compliant; elevated anti-squirt safety bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser. Unit shall have hinged access from front. Stainless steel finish. Visual filter monitor.
1. Capacity: 8 gph of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
 2. Electrical: 115 VAC, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.
- C. Bottle Filler: Materials to match fountain.
- D. Filter: NSF 42, 53 and 372. Quick disconnect, 1/4 turn installation with automatic inlet shut-off valve. Filters two prevalent PFAS chemicals, lead, Class 1 particulates, cysts and chlorine taste and order.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.
- D. Examine floors and substrates and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
- E. Inspect fixtures and accessories that are to be removed and relocated. Damaged or blemished items shall be brought to Architect's/Engineer's attention before reinstalling.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide supplies to fixtures with stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Piping exposed to view shall be chrome plated.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- B. Adjust or replace washers to prevent leaks at faucets and stops.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.08 FEILD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.

**SECTION 23 0005
BASIC HVAC REQUIREMENTS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 23.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under item "A" above.

1.02 APPLICATION

- A. This section applies to all mechanical work. The contractors involved shall check all sections of the specifications in addition to the particular section covering their specific trade. Each distinct section of the specifications aimed for one trade may have detailed information with regards to other trades, therefore, it is imperative that all sections be reviewed to get a complete picture of all other trades' functions and work required.
- B. The mechanical contractor is responsible for the installation and operation of the hvac systems and temperature control systems.
- C. The mechanical contractor is responsible for receiving, unloading and placement of all of the owner provided equipment.

1.03 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

1.04 ALTERNATES AND SUBSTITUTIONS

- A. Refer to Division 01 - General Requirements for procedures.

1.05 DEVIATION FROM BASIS OF DESIGN MANUFACTURER

- A. Products identified within the schedules and details are used as the basis of design for laying out and coordinating with other trades such as structural, architectural, and electrical. Should the Division 23 Contractors submit equipment by a Manufacturer other than that indicated as the Basis of Design in the Drawings, Contractor shall then be responsible for evaluating the impacts of the proposed Manufacturer's equipment, even if the Manufacturer is listed in the specifications as an approved equal. This includes the proposed Manufacturer's electrical, architectural and structural requirements and their subsequent impacts on the current design (roof openings, curbs, structural support, etc.) and coordination of any differing dimensions and clearances with all other trades.

1.06 MATERIALS

- A. Mechanical equipment is to be furnished with motors, electrical controls and protective devices, and integral operating devices which are normally included by the manufacturer or required by the Contract Documents.
- B. The Mechanical Trades shall provide all control wiring, 120 volts and less, for the equipment and devices furnished under Division 22, and 23 of these specifications, including all wiring devices, conduit, etc.
- C. Power wiring 120 volts and greater shall be by the Electrical Trades.

1.07 DRAWINGS

- A. The drawings are diagrammatic and show the general location and arrangement of all equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. The mechanical and electrical contractor shall check all documents including architectural, structural, plumbing, HVAC and electrical to avert possible installation conflicts. Arrange work accordingly, providing such fittings, traps, valves and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.
- E. Do not scale drawings for measurements.
- F. Field verifications of actual existing conditions are required by the contractor since actual locations, distances, and levels will be governed by actual field conditions. All measurements shall be verified at the site.
- G. If during field verification, the contractor identifies that there may require substantial changes from the original plans, the contractor shall notify the architect for agreement on necessary adjustment before the installation is started
- H. Discrepancies shown between plans, or between plans and actual field conditions, or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- I. Drawings and specifications are intended to cover the completed installation of systems to function as described. The omission of the expressed reference to any item of labor and material necessary to comply with practice codes, ordinances, etc., shall not relieve the contractor from providing such additional labor and material at no cost to Owner.

1.08 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations. Applicable publications listed in all sections of Division 23 shall be the latest issue, unless otherwise noted.
- B. Rules of local utility companies and municipalities shall be complied with. Check with the utility company and/or municipality supplying service to the installation and determine all devices including, but not limited to: meters, regulators, valves which will be required and include the cost of all such items in the proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.09 MAINTENANCE

- A. Provide 40 hours of instruction to the owner's designated personnel in the maintenance and operation of equipment and systems.

- B. Provide complete maintenance and operating instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Four (4) copies of all literature shall be furnished for owner and shall be bound in book or ring binder form. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.

1.10 WARRANTY AND GUARANTEE

- A. Contractor shall guarantee all work installed by themselves or their subcontractors to be free from defect in material and workmanship for a period of one year from date of final acceptance of the work, unless a longer period is stipulated under specific headings. Contractor shall repair or replace at no additional cost to the owner, any material or equipment developing defects and shall also make good any damage caused by such defects or the correction of defects. Repairs or replacements shall bear additional guarantee, as originally called for, dated from the final acceptance of the repair or replacement. This requirement shall be binding even though it will exceed product guarantees normally furnished by some manufacturers. Contractor shall submit his own and each equipment manufacturers written certificates, warranting that each item of equipment furnished complies with all requirements of the drawings and specifications. Note that guarantee shall run from date of final acceptance of the work, not from date of installation of a device or piece of equipment.

1.11 SUBMITTALS

- A. Refer to Division 01 - General Requirements for procedures.
- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (hvac equipment, piping equipment, etc.). Refer to other sections of the mechanical specifications for additional requirements.
- C. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals not reviewed by Contractor, including Contractor stamp with signature comments.
 - 3. Submittals made after work is delivered to site and/or installed.
 - 4. Submittal resubmissions unless resubmission is required by Architect/Engineer.
- D. Types of submittals include the following:
 - 1. Shop Drawings
 - 2. Product Data Sheets
 - 3. Samples
 - 4. Manufacturers Instructions
 - 5. Maintenance Data
 - 6. Warranty
- E. Installation of any item that requires submittal approval by the engineer shall be installed at the contractors risk. The contractor, at his cost, shall remove all work installed prior to approval of the submittal.
- F. The engineer will not be responsible for errors in quantities, or dimensions required to fit the job condition, details of fabrication to insure proper assembly at the job, or for errors resulting from mistakes in submittals.

1.12 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures.
- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.

- C. Record drawings shall be maintained by the contractor up to date as the project progresses.
- D. Recording all deviations from the contract documents, indicate exact locations of all buried services both inside and outside of the building; include concealed piping and equipment in the entire contract. Final record drawings shall reflect the as-built conditions.

1.13 QUALITY ASSURANCE

- A. Other referenced standards:
 - 1. Comply with referenced standards, guidelines, data sheets from various associations, including NFPA, ANSI, ASTM, ASME, ASHRAE

PART 2 PRODUCTS

2.01 SLEEVES AND ESCUTCHEONS

- A. Provide sleeves wherever pipes pass through exterior wall, and floors. Sleeves shall be schedule 40 steel pipe cut to length. Sleeves shall terminate flush with walls, partitions and ceilings in finished areas. All sleeves through floor shall extend 2" above floor. Provide cast brass nickel-plated escutcheons with positive catches on each visible sleeve penetration. Sleeves are to be sealed at each installation with a 3M approved sealant. The space between the inside of the sleeve and the outside of the pipe or conduit within the sleeve shall be sealed at each installation with a 3M approved sealant.

2.02 DIELECTRIC UNIONS

- A. Dielectric unions shall be used to connect dissimilar metals (such as steel and copper) to prevent electrolytic action.

2.03 FILTERS

- A. Provide and maintain filters in air handling systems throughout the construction period and prior to final acceptance of the building. Do not run air handling equipment without all prefilters and final filters as specified. Immediately prior to final building acceptance by the owner, contractor shall replace all disposable type air filters with new.

2.04 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS

- A. General Requirements:
 - 1. Provide building attachments required for supporting mechanical work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
 - 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
 - 3. If specially designed building attachments are required, retain the services of a licensed structural engineer to design such building attachments.
 - 4. Approved Manufacturers: Grinnell, or equivalent products by Michigan Hanger and B-Line.
 - 5. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
 - 1. Support mechanical work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.
 - a. Center beam clamp - for loads over 120 lb.: Malleable center hung Grinnell Fig. 228.
 - b. Side beam clamp with retaining clips - for loads up to 120 lb.
- C. Cast in Place Concrete Inserts:
 - 1. Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Grinnell Fig. 285 lightweight concrete insert for loads up to 400# or Grinnell Fig. 281 Wedge Type concrete insert for loads up to 1200#
- D. Drilled Insert Anchors:

1. Where mechanical work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.
2. Manufacturers: Hilti

PART 3 EXECUTION

3.01 GENERAL

- A. Existing piping and ductwork: when encountered during the course of work, protect, brace and support existing piping and ductwork where required for proper execution of the work.
- B. Interruption of existing active piping and ductwork: when the course of work makes shut-down of services unavoidable, the mechanical contractor shall schedule the shut-down at such time as approved by the owners representative, which will cause least interference with established operating routine.
- C. Arrange work accordingly, providing such fittings as duct transitions traps, valves and accessories necessary to complete all construction in an orderly fashion.
- D. Install all equipment in strict accordance all directions and recommendations furnished by the manufacturer.
- E. Roof mounted equipment requiring service shall be located a minimum of 10 feet from roof edges. Where equipment can't be located away from roof edge and guard rails are not provided, provide permanent fall arrest anchorage connection device that complies with ANSI/ASSE Z 359.1.

3.02 ACCESSIBILITY

- A. Do not locate valves, traps, controls, unions, dampers, etc. in any system at a location that will be inaccessible after construction is completed. Maintain accessibility for all components in mechanical, electrical, and plumbing systems.

3.03 ACCESS DOORS AND PANELS

- A. Refer to Division 08 - Openings; Provide access doors in locations as required by applicable codes and as indicated below. Coordinate locations with architectural trades.
- B. Furnish access panels to access valves, traps, control valves or devices, dampers, damper motors, etc. Access panels shall be sized as necessary for ample access, or as indicated on drawings, but no smaller than 12" x 12" where devices are within easy reach of operator, and at least 24"x24" when operator must pass through opening in order to reach the devices. Architectural Trades shall install access panels coordinated with Mechanical Trades.
- C. Access panels in fire rated walls or ceiling must be U.L. labeled for intended use. Unless otherwise indicated on plans, access doors shall be hinged flush type steel framed panel, 14 gauge minimum for frame, and with anchor straps. Only narrow border shall be exposed. Hinges shall be concealed type. Locking device shall be flush type and screw driver operated. Metal surfaces shall be prime coated with rust-inhibitive paint. Panels shall be compatible with architectural adjacent materials Manufacturer: Milcor, Bilco.

3.04 CUTTING AND PATCHING

- A. Refer to Division 01 - General Requirements and Division 02 - Existing Conditions.
- B. All cutting required shall be done by the contractor whose work is involved, without extra cost the owner. All patching and restoration including the furnishing and installation of access panels in ceiling, walls; etc. Within the building lines shall be done by the respective, responsible contractor. No cutting of structural steel, concrete, or wood shall be done without prior approval and explicit directions of the architect patched by the respective, responsible contractor.

- C. The contractor, under whose jurisdiction the work may fall, shall provide labor, material, and tools required to cut, repair, protect, cap, or relocate existing pipes, conduits, or utilities interfering with or uncovered during work, per regulations of the authorities having jurisdiction.

3.05 ROUGH-IN FOR CONNECTION TO EQUIPMENT

- A. It shall be the responsibility of each contractor to study the architectural, structural, electrical, and mechanical drawings, conferring with the various trades involved and checking with the supplier of equipment in order to properly rough-in for all equipment.

3.06 MATERIAL AND EQUIPMENT

- A. All material and equipment shall be new and of the best quality used for the purpose in good commercial practice, and shall be the standard product of reputable manufacturers. The material and equipment must meet approval of state and local codes in the area it is being used. Roof decks shall not be used to support piping, conduit, equipment, devices, etc.

3.07 SEAL PENETRATIONS

- A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings. Provide adequate clearance to allow for proper sealing.

3.08 SOUND CONTROL

- A. Penetrations shall be maintained airtight to prevent sound transfer.
- B. Piping, ductwork, etc. shall pass through sleeves. Pack sleeves tight with glass fiber or oakum and caulked on both sides with non-hardening acoustical sealant.

3.09 FIRESTOPPING

- A. Refer to Division 07 - Thermal and Moisture Protection for more information.
- B. Provide UL classified firestopping system for mechanical penetrations through rated walls and floors to maintain the fire rating.

3.10 DELIVERY, STORAGE AND HANDLING OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; All equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager and be performed in a manner as to avoid damage, deterioration and loss.
- C. Contractor shall provide temporary protection for installed equipment prior to project completion.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. All equipment shall be inspected prior to installation to assure that equipment is free from defect and damage.
- F. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. Protect dampers, grilles, louvers from damage to operating linkages and blades.

3.11 CLEANING

- A. Refer to Division 01 - General Requirements; all mechanical equipment and components shall be cleaned as frequently as necessary through the construction process and again prior to project completion.

3.12 CONTROL WIRING

- A. All control wiring for mechanical and electrical equipment, including motor starters, shall be 120 volt maximum and wired with one side of the coil grounded and the operating contacts in the north side of the circuit. All control wiring shall be installed in conduit.

**SECTION 23 0505
SELECTIVE DEMOLITION FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Demolition and extension of existing mechanical work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.

1.03 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the system of minor electrical demolition as described in this specification.
- B. The demolition documents plans and specification have been prepared from existing non-as built documents and cursory non-invasive field investigation.
- C. It is the contractors obligation to become familiar with the extent of demolition and the existing condition before submitting their bid.
- D. During demolition if the contractor discovers unforeseen significant non-code compliance conditions of the existing installation they shall notify the Architect and Engineer immediately in writing.
- E. The contractor shall become familiar with the drawings and scope of work of other trades as the work scope of those trades relates to mechanical equipment and connection requirements.
- F. During demolition the contractor shall record on site as-builts all hydronic system piping capped branches, capped supply air, return air and exhaust ducts for reuse in renovated project space.

PART 2 PRODUCTS

2.01 MATERIALS

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

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping, ductwork, equipment, accessories, controls and control wiring/tubing to be demolished serve only equipment and facilities within the demolition areas.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies between drawings and field conditions to Owner and Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Identify locations for capping piping, ductwork and controls before any demolition work commences.
- B. Confirm isolation valve locations for hydronic piping. Repair leaking isolation valves or replace inoperable valves before commencing piping demolition.
- C. Cap and seal air-tight supply, return and exhaust air ductwork at shaft walls before commencing sheet metal demolition.
- D. Identify existing controls wiring and/or tubing that serves equipment before any demolition work commences.

3.03 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

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- A. Remove, relocate, and extend existing mechanical piping, sheet metal, and controls work to accommodate new construction.
- B. Remove hydronic water piping back to isolation valve.
- C. Remove all supply, return and exhaust air ductwork back to main connection.
- D. Contractor shall ensure all modified systems are functional and in working order.
- E. Pneumatic tubing for demolished equipment shall be removed back to mains and mains capped. Where existing pneumatic control systems are partially demolished or modified, the contractor shall take extra care to ensure that portions of the existing system intended to remain are left in proper working order.

3.04 CLEANING AND REPAIR

- A. Refer to Division 01 - General Requirements for procedures.
- B. Clean and repair existing materials, piping, sheet metal, diffusers, accessories and equipment that remain or that are to be reused.

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

1.02 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.
- D. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Dampers: Ceiling tacks, where located above lay-in ceiling.
- C. Ductwork: Nameplates.
- D. Piping: Tags.
- E. Thermostats: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 2. Seton Identification Products, a Tricor Direct Company: www.seton.com/#sle.
 - 3. Brady Corporation: www.bradycorp.com.
 - 4. Champion America, Inc: www.champion-america.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Letter Color: White.
- C. Letter Height: 1/4 inch.
- D. Background Color: Black.

2.03 TAGS

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com/#sle.
 - 3. Brady Corporation: www.bradycorp.com.
 - 4. Champion America, Inc: www.champion-america.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.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com/#sle.
 - 3. Brady Corporation: www.bradycorp.com.
 - 4. Champion America, Inc: www.champion-america.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Color: Comply with ASME A13.1.
- 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. Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

2.05 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

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 underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with nameplates. Small devices, such as inline pumps, may be identified with tags.
- F. Identify control panels and major control components outside panels with nameplates.
- G. Identify thermostats relating to terminal boxes or valves with nameplates.
- H. Identify valves in main and branch piping with tags.
- I. Identify air terminal units and radiator valves with numbered tags.
- J. Identify piping, concealed or exposed, with pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction and pressure. Install in clear view and align with axis of piping. 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.

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC & PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 23 0005 - Basic HVAC Requirements.

1.03 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, with Errata (2019).
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; 2019.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Engineer and Owner.
 - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 3. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - f. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.
 - g. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - h. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - i. Method of checking building static and exhaust fan and/or relief damper capacity.

- j. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - k. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit to the the Engineer within two weeks after completion of testing, adjusting, and balancing.
 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Owner and Engineer and for inclusion in operating and maintenance manuals.
 4. Provide report complete with index page, with cover identification at front. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 5. Include actual instrument list, with manufacturer name, serial number, date of use and date of calibration.
 6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 8. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Report date.
- D. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

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. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABBB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Approved TAB Agencies:

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1. Enviro-Aire. 586.779.6200; <https://enviro-aire.com>
2. Controls Solutions Inc. (CSI). 616.247.9422; <https://controlyourbuilding.com>
3. Environmental Testing Services. 248.859.6100; <https://www.etsmi.com>.
4. Integrity Test and Balance, Inc. 231.929.0940
5. International Test and Balance, Inc. 248.559.5864
6. Air Solutions, Inc. 810.358.8644
7. Substitutions must be approved by Engineer during Bid Phase.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
- B. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

- A. Air Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Plumbing Systems: Adjust to within plus or minus 5 percent of design.

3.04 RECORDING AND ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.05 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. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- L. For fans with variable pitch sheaves: Sheaves in equipment provided by manufacturer are for final belt and sheave sizing ONLY. TAB contractor shall be responsible for providing and installing final sheave and belt for fan.
- M. Provide building static pressure readings when all systems have been balanced.

3.06 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Existing HVAC and Plumbing equipment and loads where modified and/or where downstream devices have been modified.
 - 2. Plumbing Pumps.
 - 3. Packaged Terminal Air Conditioning Units.
 - 4. Terminal Heat Transfer Units.
 - 5. Air Handling Units.
 - 6. Fans.
 - 7. Air Inlets and Outlets.

3.07 MINIMUM DATA TO BE REPORTED

- A. Building:
 - 1. Provide building static pressure readings when all systems have been balanced.
 - 2. Final differential pressure setpoint for hydronic systems and VAV air handling systems.
- B. Direct-drive Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- C. Combustion Equipment:
 - 1. Manufacturer.
 - 2. Model number.
 - 3. Serial number.
 - 4. Firing rate.
 - 5. Gas flow rate.
 - 6. Burner manifold gas pressure.

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7. Ambient temperature.
8. Heat output.
- D. Cooling Coils:
 1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Entering air DB temperature, design and actual.
 7. Entering air WB temperature, design and actual.
 8. Leaving air DB temperature, design and actual.
 9. Leaving air WB temperature, design and actual.
 10. Saturated suction temperature, design and actual.
 11. Air pressure drop, design and actual.
- E. Heating Coils:
 1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Leaving water temperature, design and actual.
 7. Entering air temperature, design and actual.
 8. Leaving air temperature, design and actual.
 9. Air pressure drop, design and actual.
- F. Electric Duct Heaters:
 1. Manufacturer.
 2. Identification/number.
 3. Location.
 4. Model number.
 5. Design kW.
 6. Number of stages.
 7. Phase, voltage, amperage.
 8. Test voltage (each phase).
 9. Test amperage (each phase).
 10. Air flow, specified and actual.
 11. Temperature rise, specified and actual.
- G. Air Moving Equipment:
 1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Arrangement/Class/Discharge.
 6. Air flow, specified and actual.
 7. Return air flow, specified and actual.
 8. Outside air flow, specified and actual.
 9. Total static pressure, specified and actual.
 10. External static pressure, specified and actual.
 11. Inlet pressure.
 12. Discharge pressure.
 13. Sheave Make/Size/Bore.
 14. Number of Belts/Make/Size.
 15. Fan RPM.

H. Fans:

1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure, specified and actual.
7. External static pressure, specified and actual.
8. Inlet pressure.
9. Discharge pressure.
10. Motor drive type.
11. Electrical data.
12. Service factor.
13. Frame size.
14. Sheave Make/Size/Bore.
15. Number of Belts/Make/Size.
16. Fan RPM.

I. Filters:

1. Static pressure profile with measured and design static pressure drops

J. Inlets/Outlets Data:

1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal face size.
5. Terminal neck size.
6. Area factor.
7. Design velocity.
8. Design air flow.
9. Test (final) velocity.
10. Test (final) air flow.
11. Percent of design air flow.

**SECTION 23 0713
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Jacketing and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 23 0005 - Basic HVAC Requirements.
- B. 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; 2021.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2023.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).
- E. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.
- G. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019 (Reapproved 2022).
- H. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers; 2015 (Reapproved 2022).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).
- K. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- L. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- M. 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 data, description, thermal and/or acoustical characteristics, list of materials and thickness for each service, and locations for duct insulation and duct liners to be used on project.

1.05 QUALITY ASSURANCE

- A. 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/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 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 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. 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. Tie Wire: Annealed steel, 16 gauge, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 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.
- 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 two coats of vapor barrier mastic and glass tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure-sensitive rubber-based adhesive.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Armacell LLC: www.armacell.us/#sle.
 - 2. K-Flex USA LLC: www.kflexusa.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 180 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- D. Weather Barrier Coating: Air dried, contact adhesive, compatible with insulation and ASTM E84 compliant.
 - 1. Manufacturers:
 - a. Design Polymerics: www.designpoly.com/#sle.
 - b. Vimasco Corporation: www.vimasco.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements

2.05 JACKETING AND ACCESSORIES

- A. Flexible Weather-Proofing Outdoor Jacket: Self-healing, field-applied outdoor cladding.
 - 1. Material: Aluminum foil/polymer laminate with rubberized asphalt layer and acrylic adhesive.
 - 2. Thickness: 34 mils minimum.
 - 3. Finish: Embossed.
 - 4. Color: White.
 - 5. Water Vapor Transmission: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - 6. Mold Resistance: Pass when tested in accordance with ASTM C1338.
 - 7. Emissivity: 0.30 when tested in accordance with ASTM C1371.
 - 8. Manufacturers:
 - a. Polyguard Products: www.polyguardproducts.com.com/#sle.
 - b. FlexClad Products.
 - c. Substitutions: See Section 01 6000 - Product Requirements

2.06 DUCT LINER

- A. Manufacturers:
 - 1. CertainTeed Corporation: www.certainteed.com/#sle.
 - 2. Johns Manville: www.jm.com/#sle.
 - 3. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; rigid board and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.
 - 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 inch Thickness: 0.45.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. 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. Duct and Plenum Liner Application:
 - 1. Adhere insulation with adhesive for 90 percent coverage.
 - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 3. Seal and smooth joints. Seal and coat transverse joints.
 - 4. Seal liner surface penetrations with adhesive.
 - 5. Duct dimensions indicated are net inside dimensions required for airflow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Exhaust and Relief Ducts Within 10 ft of Exterior Openings:
 - 1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
- B. Outside Air Intake Ducts:
 - 1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
- C. Return Air Ducts:
 - 1. Duct Liner: 1 inch thick. First 10 feet from equipment only.
- D. Supply Ducts:
 - 1. Duct Liner: 1 inch thick. First 10 feet from equipment only.
 - 2. Located in plenum or unconditioned space:
 - a. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.

**SECTION 23 0925
DIRECT-DIGITAL CONTROL (DDC) SYSTEMS FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control Equipment
- B. Software

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions.
- C. Section 23 0005 - Basic HVAC Requirements.
- D. Section 23 0553 - Identification for HVAC Piping and Equipment.
- E. Section 23 0800 - Commissioning of HVAC.
- F. Section 23 0913 - Instrumentation and Control Devices for HVAC.
- G. Section 23 0915 - Variable Frequency Drives.
- H. Section 23 2123 - Hydronic Pumps.
- I. Section 23 3300 - Air Duct Accessories.
- J. Section 23 3423 - HVAC Power Ventilators.
- K. Section 23 5233.13 - Finned Water-Tube Boilers.
- L. Section 23 7223 - Packaged Air-to-Air Energy Recovery Units.
- M. Section 23 7413 - Packaged Outdoor Central-Station Air-Handling Units.
- N. Section 23 8148 - Water Source Heat Pumps.
- O. Division 26 - Electrical.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 PRODUCT INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 23 0913 - Instrumentation and Control Devices for HVAC:
 - 1. Duct static pressure sensors
 - 2. H2O Pressure Differential/Flow Switches
- B. Section 28 4600 - Fire Detection and Alarm:
 - 1. Smoke Detectors/Fire Stats

1.05 PRODUCTS NOT FURNISHED OR INSTALLED BUT INTEGRATED WITH THE WORK OF THIS SECTION

- A. General:
 - 1. Coordination Meeting: The Installer furnishing the DDC network shall meet with the Installer(s) furnishing each of the following products to coordinate details of the interface between these products and the DDC network. The Owner or his designated representative shall be present at this meeting. Each Installer shall provide the Owner and all other Installers with details of the proposed interface, hardware and software identifiers for the interface points, network identifiers, wiring requirements, communication speeds, and required network accessories. The purpose of this meeting shall be to insure there are no unresolved issues regarding the integration of these products into the DDC network. Submittals for these products shall not be approved prior to the completion of this meeting.
- B. Section 23 8000 - Decentralized HVAC Equipment:

1. Unit ventilators, unit heaters, fan coils, etc.: Unit ventilators, unit heaters, fan coils, cabinet heaters, convective or fin tube heaters, zone reheat, and similar terminal units: These units shall be furnished configured to accept control inputs from an external building automation system controller. Factory mounted safeties and other controls shall not interfere with this controller.
- C. Communications with Third Party Equipment:
 1. Any additional integral control systems included with the products integrated with the work of this section shall be furnished with a open protocol network interface for integration into the Direct Digital Control System described in this section.

1.06 DESCRIPTION

- A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers and a web-based operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
- B. The system shall directly control HVAC equipment as detailed on the drawings. Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Furnish energy conservation features such as optimal start and stop, night setback, request-based logic, and demand level adjustment of setpoints as specified in the sequence.
- C. System shall use open protocol communications to the operator workstation or web server and for communication between control modules.

1.07 APPROVED CONTROL SYSTEMS INSTALLERS

- A. SC Tech
- B. Substitutions: At the discretion of Lansing Public Schools
- C. Inclusion on this list does not guarantee acceptance of products or installation. Control systems shall comply with the terms of this specification.
 1. The Contractor shall use only operator workstation software, controller software, custom application programming language, and controllers from the corresponding manufacturer and product line unless the Owner approves use of multiple manufacturers.

1.08 QUALITY ASSURANCE

- A. Installer and Manufacturer Qualifications
 1. Installer shall have an established working relationship with the Control System Manufacturer.
 2. Installer shall have successfully completed Control System Manufacturer's control system training. Upon request, Installer shall present record of completed training including course outlines.
- B. Perform work in accordance with NFPA 70.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.

1.09 CODES AND STANDARDS

- A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes:
 1. National Electric Code (NEC)
 2. International Building Code (IBC)
 - a. Section 719 Ducts and Air Transfer Openings
 - b. Section 907 Fire Alarm and Detection Systems
 - c. Section 909 Smoke Control Systems

- d. Chapter 28 Mechanical
3. International Mechanical Code (IMC)
4. ANSI/ASHRAE 135-2004: Data Communication Protocol for Building Automation and Control Systems (BACNET)

1.10 SYSTEM PERFORMANCE

- A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).
 1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
 2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec. and shall automatically refresh every 15 sec.
 3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
 4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
 5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 15 sec.
 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
 7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
 8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
 9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy as listed below:
 - a. Space Temperature: +/- 1 degrees F
 - b. Ducted Air: +/- 1 degrees F
 - c. Outside Air: +/- 2 degrees F
 - d. Electrical (A, V, W, Power Factor): +/- 1% of reading
 - 1) Not including utility supplied meters
 10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances as listed below:
 - a. Space Temperature: +/- 2.0 degrees F

1.11 SUBMITTALS

- A. Direct Digital Control System Hardware
 1. Complete bill of materials indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
 2. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
 - a. Direct digital controllers (controller panels)
 - b. Transducers and transmitters
 - c. Sensors (include accuracy data)
 - d. Actuators
 - e. Valves
 - f. Relays and switches
 - g. Control panels
 - h. Power supplies
 - i. Batteries
 - j. Operator interface equipment

- k. Wiring
 3. Wiring diagrams and layouts for each control panel. Show termination numbers.
 4. Floor plan schematic diagrams indicating field sensor and controller locations.
 5. Riser diagrams showing control network layout, communication protocol, and wire types.
- B. Central System Hardware and Software
1. Complete bill of material indicating quantity, manufacturer, model number, and relevant technical data of equipment used.
 2. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
 - a. Central Processing Unit (CPU) or web server
 - b. Monitors
 - c. Keyboards
 - d. Power supplies
 - e. Battery backups
 - f. Interface equipment between CPU or server and control panels
 - g. Operating System software
 - h. Operator interface software
 - i. Color graphic software
 - j. Third-party software
 3. Schematic diagrams of control, communication, and power wiring for central system installation. Show interface wiring to control system.
 4. Network riser diagrams of wiring between central control unit and control panels.
- C. Controlled Systems
1. Riser diagrams showing control network layout, communication protocol, and wire types.
 2. Schematic diagram of each controlled system. Label control points with point names. Graphically show locations of control elements.
 3. Schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.
 4. Instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.
 5. Complete description of control system operation including sequences of operation. Include and reference schematic diagram of controlled system. List I/O points and software points. Indicate alarmed and trended points.
 6. Sequence of Operations shall include both equipment with packaged controls and equipment with TCC provided controls - regardless of who is purchasing the equipment (i.e. Owner Furnished Equipment or Kitchen FSE Consultant furnished equipment). Tcc shall reac out to the Equipment Supplier for packaged controls and provide a detailed list of items by Equipment Supplier and by TCC. Sequence of Operations of packaged equipment shall match sequence as outlined on drawings. TCC maintains all responsibility for the control sequence of all Equipment, regardless of who furnishes.
- D. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

1.12 WARRANTY

- A. Warrant work as follows:

1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
2. Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
3. Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve Contractor-identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.
4. Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

1.13 OWNERSHIP OF PROPRIETARY MATERIAL

- A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
 1. Graphics
 2. Record drawings
 3. Database
 4. Application programming code
 5. Documentation

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.02 COMMUNICATIONS

- A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise an open protocol internetwork.
- B. Install new wiring and network devices as required to provide a complete and workable control network.
- C. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
- D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
 1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
 2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.

- E. Controllers with real-time clocks shall synchronize with the building management system. System shall automatically synchronize system clocks daily from an operator-designated controller via the internetwork. If applicable, system shall automatically adjust for daylight saving and standard time.
- F. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.
- G. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization (WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.
 - 1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
 - 2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
 - 3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
 - 4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.03 OPERATOR INTERFACE

- A. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information. In addition to the primary operator interface, the system shall include a secondary interface compatible with a locally available commercial wireless network and viewable on a commercially available wireless device such as a Wireless Access Protocol (WAP) enabled cellular telephone or personal digital assistant (PDA). This secondary interface may be text-based and shall provide a summary of the most important data. As a minimum, the following capabilities shall be provided through this interface:
 - 1. An operator authentication system that requires an operator to log in before viewing or editing any data, and which can be configured to limit the privileges of an individual operator.
 - 2. The ability to view and acknowledge any alarm in the system. Alarms or links to alarms shall be provided on a contiguous list so the operator can quickly view all alarms.
 - 3. A summary page or pages for each piece of equipment in the system. This page shall include the current values of all critical I/O points and shall allow the operator to lock binary points on or off and to lock analog points to any value within their range.
 - 4. Navigation links that allow the operator to quickly navigate from the home screen to any piece of equipment in the system, and then return to the home screen. These links may be arranged in a hierarchical fashion, such as navigating from the home screen to a particular building, then to a specific floor in the building, and then to a specific room or piece of equipment.
- B. Communication. Web server or workstation and controllers shall communicate using an open protocol communications language. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol.
- C. Hardware. Each workstation or web server shall consist of the following:
 - 1. Hardware Base. Industry-standard hardware shall meet or exceed DDC system manufacturer's recommended specifications and shall meet response times as specified. Hard disk shall have sufficient memory to store system software, one year of data for trended points, and a system database at least twice the size of the existing database at system acceptance.

- D. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:
1. Log In and Log Out. System shall require user name and password to log in to operator interface.
 2. Point-and-click Navigation. Operator interface shall be graphically based and shall allow operators to access graphics for equipment and geographic areas using point-and-click navigation.
 3. View and Adjust Equipment Properties. Operators shall be able to view controlled equipment status and to adjust operating parameters such as setpoints, PID gains, on and off controls, and sensor calibration.
 4. View and Adjust Operating Schedules. Operators shall be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period, and to simultaneously schedule related equipment. System shall clearly show exception schedules and holidays on the schedule display.
 5. View and Respond to Alarms. Operators shall be able to view a list of currently active system alarms, to acknowledge each alarm, and to clear (delete) unneeded alarms.
 6. View and Configure Trends. Operators shall be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operator shall be able to create custom trend graphs to display on the same page data from multiple trended points.
 7. View and Configure Reports. Operators shall be able to run preconfigured reports, to view report results, and to customize report configuration to show data of interest.
 8. Manage Control System Hardware. Operators shall be able to view controller status, to restart (reboot) each controller, and to download new control software to each controller.
 9. Manage Operator Access. Typically, only a few operators are authorized to manage operator access. Authorized operators shall be able to view a list of operators with system access and of functions they can perform while logged in. Operators shall be able to add operators, to delete operators, and to edit operator function authorization. Operator shall be able to authorize each operator function separately.
- E. System Software.
1. Operating System. Web server shall have an industry-standard professional-grade operating system. Acceptable systems include Microsoft Windows XP Pro, Red Hat Linux, or Sun Solaris. Coordinate operating system type with the Owner.
 2. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using dynamic colors to represent zone temperature relative to zone setpoint.
 - a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
 - b. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
 - c. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
 - d. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).

- F. System Tools. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.
1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
 2. Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
 3. System Configuration. Operators shall be able to configure the system.
 4. Online Help. Context-sensitive online help for each tool shall assist operators in operating and editing the system.
 5. Security. System shall require a user name and password to view, edit, add, or delete data.
 - a. Operator Access. Each user name and password combination shall define accessible viewing, editing, adding, and deleting functions in each system application, editor, and object. Authorized operators shall be able to vary and deny each operator's accessible functions based on equipment or geographic location.
 - b. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. Operators shall be able to adjust automatic log out delay.
 - c. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
 6. System Diagnostics. System shall automatically monitor controller and I/O point operation. System shall annunciate controller failure and I/O point locking (manual overriding to a fixed value).
 7. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as detailed on the drawings.
 8. Alarm Messages. Alarm messages shall use an English language descriptor without acronyms or mnemonics to describe alarm source, location, and nature.
 9. Alarm Reactions. Operator shall be able to configure (by object) actions workstation or web server shall initiate on receipt of each alarm. As a minimum, workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
 10. Alarm Maintenance. Operators shall be able to view system alarms and changes of state chronologically, to acknowledge and delete alarms, and to archive closed alarms to the workstation or web server hard disk from each workstation or web browser interface.
 11. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk.
 12. Object and Property Status and Control. Operator shall be able to view, and to edit if applicable, the status of each system object and property by menu, on graphics, or through custom programs.
 13. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
 14. Standard Reports. Furnish the following standard system reports:
 - a. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.

- b. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.
- c. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
 - 1) Alarm History.
 - 2) Trend Data. Operator shall be able to select trends to be logged.
 - 3) Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.
15. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. Reports shall be launched from the operator interface.
16. Graphics Generation. Graphically based tools and documentation shall allow Operator to edit system graphics, to create graphics, and to integrate graphics into the system. Operator shall be able to add analog and binary values, dynamic text, static text, and animation files to a background graphic using a mouse.
17. Graphics Library. Complete library of standard HVAC equipment graphics shall include equipment such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. Library shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. Library graphic file format shall be compatible with graphics generation tools.
18. Custom Application Programming. Operator shall be able to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:
 - a. Language. Language shall be graphically based and shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks.
 - b. Programming Environment. Tool shall provide a full-screen, cursor-and-mouse-driven programming environment that incorporates word processing features such as cut and paste. Operators shall be able to insert, add, modify, and delete custom programming code, and to copy blocks of code to a file library for reuse in other control programs.
 - c. Independent Program Modules. Operator shall be able to develop independently executing program modules that can disable, enable and exchange data with other program modules.
 - d. Debugging and Simulation. Operator shall be able to step through the program observing intermediate values and results. Operator shall be able to adjust input variables to simulate actual operating conditions. Operator shall be able to adjust each step's time increment to observe operation of delays, integrators, and other time-sensitive control logic. Debugger shall provide error messages for syntax and for execution errors.
 - e. Conditional Statements. Operator shall be able to program conditional logic using compound Boolean (AND, OR, and NOT) and relational (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
 - f. Mathematical Functions. Language shall support floating-point addition, subtraction, multiplication, division, and square root operations, as well as absolute value calculation and programmatic selection of minimum and maximum values from a list of values.
 - g. Variables: Operator shall be able to use variable values in program conditional statements and mathematical functions.

- 1) Time Variables. Operator shall be able to use predefined variables to represent time of day, day of the week, month of the year, and date. Other predefined variables or simple control logic shall provide elapsed time in seconds, minutes, hours, and days. Operator shall be able to start, stop, and reset elapsed time variables using the program language.
 - 2) System Variables. Operator shall be able to use predefined variables to represent status and results of Controller Software and shall be able to enable, disable, and change setpoints of Controller Software as described in Controller Software section.
- G. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

2.04 CONTROLLER SOFTWARE

- A. Building and energy management application software shall reside and operate in system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.
- B. Scheduling. System shall provide the following schedule options as a minimum:
 1. Weekly. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
 2. Exception. Operator shall be able to designate an exception schedule for each of the next 365 days. After an exception schedule has executed, system shall discard and replace exception schedule with standard schedule for that day of the week.
 3. Holiday. Operator shall be able to define 24 special or holiday schedules of varying length on a scheduling calendar that repeats each year.
- C. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
- D. Binary and Analog Alarms. See Paragraph 2.3.F.7 (Alarm Processing).
- E. Alarm Reporting. See Paragraph 2.3.F.9 (Alarm Reactions).
- F. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.
- G. Maintenance Management. System shall generate maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits.
- H. Sequencing. Application software shall sequence chillers, boilers, and pumps as detailed on the drawings.
- I. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs.
- J. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.
- K. Energy Calculations.
 1. System shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
 2. System shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.
- L. Anti-Short Cycling. Binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.

- M. On and Off Control with Differential. System shall provide direct- and reverse-acting on and off algorithms with adjustable differential to cycle a binary output based on a controlled variable and setpoint.
- N. Runtime Totalization. System shall provide an algorithm that can totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit.

2.05 CONTROLLERS

- A. General. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified.
- B. Communication.
 - 1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
 - 2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
 - 3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.
 - 4. Stand-Alone Operation. Each piece of equipment specified shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.
- C. Environment. Controller hardware shall be suitable for anticipated ambient conditions.
 - 1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
 - 2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
- D. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.
- E. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.
- F. Serviceability.
 - 1. Controllers shall have diagnostic LEDs for power, communication, and processor.
 - 2. Wires shall be connected to a field-removable modular terminal strip or to a termination card connected by a ribbon cable.
 - 3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
- G. Memory.
 - 1. Controller memory shall support operating system, database, and programming requirements.
 - 2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
 - 3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.

- H. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
- I. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.06 INPUT AND OUTPUT INTERFACE

- A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
- B. Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.
- C. Binary Inputs. Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.
- D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall accumulate up to 10 pulses per second.
- E. Analog Inputs. Analog inputs shall monitor low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- F. Binary Outputs. Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.
- G. Analog Outputs. Analog outputs shall send a modulating 0-10 Vdc or 4-20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.
- H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.
- I. Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

2.07 POWER SUPPLIES AND LINE FILTERING

- A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
 - 1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
 - a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
 - b. Line voltage units shall be UL recognized and CSA listed.
- B. Power Line Filtering.
 - 1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:
 - 2. Dielectric strength of 1000 V minimum

3. Response time of 10 nanoseconds or less
4. Transverse mode noise attenuation of 65 dB or greater
5. Common mode noise attenuation of 150 dB or greater at 40-100 Hz

2.08 AUXILIARY CONTROL DEVICES

- A. Local Control Panels.
 1. Indoor control panels shall be fully enclosed NEMA 1 construction with hinged door key-lock latch and removable sub-panels. A common key shall open each control panel and sub-panel.
 2. Prewire internal and face-mounted device connections with color-coded stranded conductors tie-wrapped or neatly installed in plastic troughs. Field connection terminals shall be UL listed for 600 V service, individually identified per control and interlock drawings, with adequate clearance for field wiring.
 3. Each local panel shall have a control power source power switch (on-off) with overcurrent protection.

2.09 WIRING AND RACEWAYS

- A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.
- B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

2.10 FIBER OPTIC CABLE SYSTEM

- A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.
- B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Thoroughly examine project plans for control device and equipment locations. Report discrepancies, conflicts, or omissions to Architect or Engineer for resolution before starting rough-in work.
- B. Inspect site to verify that equipment can be installed as shown. Report discrepancies, conflicts, or omissions to Engineer for resolution before starting rough-in work.
- C. Examine drawings and specifications for work of others. Report inadequate headroom or space conditions or other discrepancies to Engineer and obtain written instructions for changes necessary to accommodate Section 23 0923 work with work of others. Controls Contractor shall perform at his expense necessary changes in specified work caused by failure or neglect to report discrepancies.

3.02 PROTECTION

- A. Controls Contractor shall protect against and be liable for damage to work and to material caused by Contractor's work or employees.
- B. Controls Contractor shall be responsible for work and equipment until inspected, tested, and accepted. Protect material not immediately installed. Close open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.03 COORDINATION

- A. Site.
 1. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades. If installation without coordination causes interference with work of other trades, Contractor shall correct conditions without extra charge.

2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
- B. Test and Balance.
 1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing.
 2. Train Test and Balance Contractor to use control system interface tools.
 3. Provide a qualified technician to assist with testing and balancing the first 20 terminal units.
 4. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.
- C. Life Safety.
 1. Duct smoke detectors required for air handler shutdown are provided under Division 28. Interlock smoke detectors to air handlers for shutdown as indicated on drawings.
 2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23. Interlock smoke dampers to air handlers as indicated on drawings.
 3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.
- D. Coordination with Other Controls. Integrate with and coordinate controls and control devices furnished or installed by others as follows.
 1. Communication media and equipment shall be provided as specified.
 2. Each supplier of a controls product shall configure, program, start up, and test that product to meet the sequences of operation detailed on the drawings.
 3. Coordinate and resolve incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
 4. Controls Contractor shall be responsible for integration of control products provided by multiple suppliers regardless of where integration is described within the contract documents.

3.04 GENERAL WORKMANSHIP

- A. Install equipment, piping, and wiring or raceway horizontally, vertically, and parallel to walls wherever possible.
- B. Provide sufficient slack and flexible connections to allow for piping and equipment vibration isolation.
- C. Install equipment in readily accessible locations as defined by National Electrical Code (NEC) Chapter 1 Article 100 Part A.
- D. Verify wiring integrity to ensure continuity and freedom from shorts and ground faults.
- E. Equipment, installation, and wiring shall comply with industry specifications and standards and local codes for performance, reliability, and compatibility.

3.05 FILED QUALITY CONTROL

- A. Work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances.
- B. Continually monitor field installation for code compliance and workmanship quality.
- C. Contractor shall arrange for work inspection by local or state authorities having jurisdiction over the work.

3.06 WIRING

- A. The control contractor shall be responsible to provide additional 120V power as required for temperature controls and building automation. Some circuits may be indicated on the electrical drawings (if applicable) or provided from existing controllers being removed. If additional circuits are required, coordinate with the electrical contractor and/or owner's representative for locations of available circuits and provide circuit breakers, wiring and conduit as necessary.

- B. The control contractor shall be responsible to provide low-voltage power supplies, wiring, conduit, etc. as necessary to power control, metering and monitoring devices.
- C. Control and interlock wiring and installation shall comply with national and local electrical codes, Division 26, and manufacturer's recommendations. Where the requirements of Section 23 09 23 differ from Division 26, Section 23 09 23 shall take precedence.
- D. NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway as specified by NEC and Division 26.
- E. Low-voltage wiring shall meet NEC Class 2 requirements. Subfuse low-voltage power circuits as required to meet Class 2 current limit.
- F. NEC Class 2 (current-limited) wires not in raceway but in concealed and accessible locations such as return air plenums shall be UL listed for the intended application.
- G. Install wiring in raceway where subject to mechanical damage and at levels below 3 m (10ft) in mechanical, electrical, or service rooms.
- H. Install Class 1 and Class 2 wiring in separate raceways. Boxes and panels containing high-voltage wiring and equipment shall not be used for low-voltage wiring except for the purpose of interfacing the two through relays and transformers.
- I. Do not install wiring in raceway containing tubing.
- J. Run exposed Class 2 wiring parallel to a surface or perpendicular to it and tie neatly at 3 m (10 ft) intervals.
- K. Use structural members to support or anchor plenum cables without raceway. Do not use ductwork, electrical raceways, piping, or ceiling suspension systems to support or anchor cables.
- L. Secure raceways with raceway clamps fastened to structure and spaced according to code requirements. Raceways and pull boxes shall not be hung on or attached to ductwork, electrical raceways, piping, or ceiling suspension systems.
- M. Size raceway and select wire size and type in accordance with manufacturer's recommendations and NEC requirements.
- N. Include one pull string in each raceway 2.5 cm (1 in.) or larger.
- O. Use color-coded conductors throughout.
- P. Locate control and status relays in designated enclosures only. Do not install control and status relays in packaged equipment control panel enclosures containing Class 1 starters.
- Q. Conceal raceways except within mechanical, electrical, or service rooms. Maintain minimum clearance of 15 cm (6 in.) between raceway and high-temperature equipment such as steam pipes or flues.
- R. Adhere to requirements in Division 26 where raceway crosses building expansion joints.
- S. Install insulated bushings on raceway ends and enclosure openings. Seal top ends of vertical raceways.
- T. Terminate control and interlock wiring related to the work of this section. Maintain at the job site updated (as-built) wiring diagrams that identify terminations.
- U. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Do not use flexible metal raceway less than ½ in. electrical trade size. Use liquid-tight flexible metal raceways in areas exposed to moisture including chiller and boiler rooms.
- V. Install raceway rigidly, support adequately, ream at both ends, and leave clean and free of obstructions. Join raceway sections with couplings and according to code. Make terminations in boxes with fittings. Make terminations not in boxes with bushings.
- W. Install signal and communication cable according to DDC system recommendations.

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway. Wiring and cable in mechanical rooms shall be installed in conduit.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.
8. Low voltage cabling shall be run separate from 120 volt control wiring.
9. Input and output wiring shall be run in separate conduit systems.
10. Analog inputs shall be run separate from digital inputs.
11. Network cabling shall be run in separate conduit system.
12. No control wiring splices are allowed.

3.07 COMMUNICATION WIRING

- A. Communication wiring shall be low-voltage Class 2 wiring.
- B. Install communication wiring in separate raceways and enclosures from other Class 2 wiring.
- C. During installation do not exceed maximum cable pulling, tension, or bend radius specified by the cable manufacturer.
- D. Verify entire network's integrity following cable installation using appropriate tests for each cable.
- E. Install lightning arrestor according to manufacturer's recommendations between cable and ground where a cable enters or exits a building.
- F. Each run of communication wiring shall be a continuous length without splices when that length is commercially available. Runs longer than commercially available lengths shall have as few splices as possible using commercially available lengths.
- G. Label communication wiring to indicate origination and destination.
- H. Ground coaxial cable according to NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

3.08 FIBER OPTIC CABLE

- A. During installation do not exceed maximum pulling tensions specified by cable manufacturer. Post-installation residual cable tension shall be within cable manufacturer's specifications.
- B. Install cabling and associated components according to manufacturers' instructions. Do not exceed minimum cable and unjacketed fiber bend radii specified by cable manufacturer.

3.09 INSTALLATION OF SENSORS

- A. Install sensors according to manufacturer's recommendations.
- B. Mount sensors rigidly and adequately for operating environment.
- C. Install room temperature sensors on concealed junction boxes properly supported by wall framing.
- D. Air seal wires attached to sensors in their raceways or in the wall to prevent sensor readings from being affected by air transmitted from other areas.
- E. Use averaging sensors in mixing plenums and hot and cold decks. Install averaging sensors in a serpentine manner vertically across duct. Support each bend with a capillary clip.

- F. Install mixing plenum low-limit sensors in a serpentine manner horizontally across duct. Support each bend with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m² (1 ft²) of coil area.
- G. Install pipe-mounted temperature sensors in wells. Install liquid temperature sensors with heat-conducting fluid in thermal wells.
- H. Install outdoor air temperature sensors on north wall at designated location with sun shield.
- I. Differential Air Static Pressure.
 - 1. Supply Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
 - 2. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Make pressure tap connections according to manufacturer's recommendations.
 - 3. Building Static Pressure. Pipe pressure sensor's low-pressure port to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe high-pressure port to a location behind a thermostat cover.
 - 4. Piping to pressure transducer pressure ports shall contain a capped test port adjacent to transducer.
 - 5. Pressure transducers, except those controlling VAV boxes, shall be located in control panels, not on monitored equipment or on ductwork. Mount transducers in a vibration-free location accessible for service without use of ladders or special equipment.
 - 6. Mount gauge tees adjacent to air and water differential pressure taps. Install shut-off valves before tee for water gauges.
- J. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.

3.10 WARNING LABELS

- A. Affix permanent warning labels to equipment that can be automatically started by the control system.
 - 1. Labels shall use white lettering (12-point type or larger) on a red background.
 - 2. Warning labels shall read as follows.
 - a. **C A U T I O N**: This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to "Off" position before servicing
- B. Affix permanent warning labels to motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.
 - 1. Labels shall use white lettering (12-point type or larger) on a red background.
 - 2. Warning labels shall read as follows.
 - a. **C A U T I O N**: This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

3.11 IDENTIFICATION OF HARDWARE AND WIRING

- A. Label wiring and cabling, including that within factory-fabricated panels, with control system address or termination number at each end within 5 cm (2 in.) of termination.
- B. Permanently label or code each point of field terminal strips to show instrument or item served.
- C. Label control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.
- D. Label each control component with a permanent label. Label plug-in components such that label remains stationary during component replacement.
- E. Label room sensors related to terminal boxes or valves with nameplates.
- F. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.
- G. Label identifiers shall match record documents.

3.12 PROGRAMMING

- A. Software Programming. Programming shall provide actions for each possible situation. Graphic- or parameter-based programs shall be documented. Text-based programs shall be modular, structured, and commented to clearly describe each section of the program.
 - 1. Application Programming. Provide application programming that adheres to the sequences of operation. Program documentation or comment statements shall reflect language used in sequences of operation.
 - 2. System Programming. Provide system programming necessary for system operation.
- B. Operator Interface.
 - 1. Standard Graphics. Provide graphics as specified in Section 23 09 23 Article 2.3 Paragraph E.2 (System Graphics). Show on each equipment graphic input and output points and relevant calculated points. Point information on graphics shall dynamically update.
 - 2. Install, initialize, start up, and troubleshoot operator interface software and functions (including operating system software, operator interface database, and third-party software installation and integration required for successful operator interface operation).

3.13 CONTROL SYSTEM CHECKOUT AND TESTING

- A. Startup Testing. Complete startup testing to verify operational control system before notifying Owner of system demonstration. Provide Owner with schedule for startup testing. Owner may have representative present during any or all startup testing.
 - 1. Calibrate and prepare for service each instrument, control, and accessory equipment furnished under Section 23 09 23.
 - 2. Verify that control wiring is properly connected and free of shorts and ground faults. Verify that terminations are tight.
 - 3. Enable control systems and verify each input device's calibration. Calibrate each device according to manufacturer's recommendations.
 - 4. Verify that binary output devices such as relays, solenoid valves, two-position actuators and control valves, and magnetic starters, operate properly and that normal positions are correct.
 - 5. Verify that analog output devices such as I/Ps and actuators are functional, that start and span are correct, and that direction and normal positions are correct. Check control valves and automatic dampers to ensure proper action and closure. Make necessary adjustments to valve stem and damper blade travel.
 - 6. Prepare a log documenting startup testing of each input and output device, with technician's initials certifying each device has been tested and calibrated.
 - 7. Verify that system operates according to sequences of operation. Simulate and observe each operational mode by overriding and varying inputs and schedules. Tune PID loops and each control routine that requires tuning.
 - 8. Alarms and Interlocks.
 - a. Check each alarm with an appropriate signal at a value that will trip the alarm.
 - b. Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction.
 - c. Test interlock actions by simulating alarm conditions to check initiating value of variable and interlock action.

3.14 CLEANING

- A. On completion of work, check equipment furnished under this section for paint damage. Repair damaged factory-finished paint to match adjacent areas. Replace deformed cabinets and enclosures with new material and repaint to match adjacent areas.

3.15 TRAINING

- A. Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.
- B. Training shall enable students to accomplish the following objectives.

Kingscott Associate, Inc.
Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

1. Proficiently operate system
 2. Understand control system architecture and configuration
 3. Understand DDC system components
 4. Understand system operation, including DDC system control and optimizing routines (algorithms)
 5. Operate workstation and peripherals
 6. Log on and off system
 7. Access graphics, point reports, and logs
 8. Adjust and change system setpoints, time schedules, and holiday schedules
 9. Recognize common HVAC system malfunctions by observing system graphics, trend graphs, and other system tools
 10. Understand system drawings and Operation and Maintenance manual
 11. Understand job layout and location of control components
 12. Access data from DDC controllers
 13. Operate portable operator's terminals
 14. Create and change system graphics
 15. Create, delete, and modify alarms, including configuring alarm reactions
 16. Create, delete, and modify point trend logs (graphs) and multi-point trend graphs
 17. Configure and run reports
 18. Add, remove, and modify system's physical points
 19. Create, modify, and delete application programming
 20. Add operator interface stations
 21. Add a new controller to system
 22. Download firmware and advanced applications programming to a controller
 23. Configure and calibrate I/O points
 24. Maintain software and prepare backups
 25. Interface with job-specific, third-party operator software
 26. Add new users and understand password security procedures
- C. Divide presentation of objectives into three sessions (1-13, 14-23, and 24-26). Participants will attend one or more of sessions, depending on knowledge level required.
1. Day-to-day Operators (objectives 1-13)
 2. Advanced Operators (objectives 1-13 and 14-23)
 3. System Managers and Administrators (objectives 1-13 and 24-26)
- D. Provide course outline and materials according to Section 23 09 23 Article 1.10 (Submittals). Provide one copy of training material per student.
- E. Instructors shall be factory-trained and experienced in presenting this material.
- F. Perform classroom training using a network of working controllers representative of installed hardware.

**SECTION 23 1123
NATURAL-GAS PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for natural gas piping systems.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 09 9113 - Exterior Painting.
- C. Section 23 0516 - Expansion Fittings and Loops for HVAC Piping.
- D. Section 23 0553 - Identification for HVAC Piping and Equipment.
- E. Section 31 2316 - Excavation.
- F. Section 31 2316.13 - Trenching.
- G. Section 31 2323 - Fill.
- H. Section 33 5216 - Gas Hydrocarbon Piping.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators; 2019.
- B. ANSI Z21.80/CSA 6.22 - Line Pressure Regulators; 2019.
- C. ANSI Z223.1 - National Fuel Gas Code; 2021.
- D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2021.
- E. ASME B31.1 - Power Piping; 2022.
- F. ASME B31.9 - Building Services Piping; 2020.
- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2023a.
- J. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- K. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.
- L. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.
- M. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends; 2011.
- N. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010, with Errata .

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.

1.05 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Steel Pipe: ASTM A53/A53M, Grade B, Type F, Schedule 40 black.
 - 1. Fittings: ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: ANSI Z223.1, welded.
 - 3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
- B. Flexible Gas Piping:
 - 1. Pre-Sleeved Corrugated Stainless Steel Tubing: Comply with ANSI LC1 / CSA 6.26.
 - 2. System shall be sleeved in a fully vent-capable polyethylene sleeve. Fittings shall have plastic containment coupling and 1/4" vent port.
 - 3. Fittings: Provided by piping system manufacturer.
 - 4. Manufacturers:
 - a. Omega Flex, Inc: www.omegaflex.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.

2.02 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Grade B, Type F, Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.
 - 3. Exterior Applications Only: Mechanical Press Sealed Fittings (Where approved by local AHJ): Double-pressed type and approved or certified, utilizing EPDM/HNBR, nontoxic, synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Viega LLC: www.viega.us/#sle.
 - 2) Nibco: www.nibco.com
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
 - b. Listings and Certifications:
 - 1) ANSI LC-4/CSA 6.32
 - 2) ICC-ES PMG 1502
 - 3) IAPMO/UPC LC-4

2.03 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.

2.04 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.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. 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.
- 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.

2.05 BALL VALVES

- A. Manufacturers:
 1. Apollo Valves: www.apollovalves.com/#sle.
 2. Milwaukee Valve Company: www.milwaukeevalve.com/#sle.
 3. Nibco, Inc: www.nibco.com/#sle.
 4. Jomar Valves: www.jomarvalve.com
 5. Bonomi: www.bonominorthamerica.com
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 2 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or hot forged brass body, 304 stainless steel or chrome plated brass or bronze ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends with union.

2.06 PLUG VALVES

- A. Manufacturers:
 1. Flomatic Valves: www.flomatic.com.
 2. Homestead: www.homesteadvalve.com
 3. Norgas Controls: www.norgascontrols.com
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction 2-1/2 Inches and Larger: MSS SP-78, 200 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

2.07 EMERGENCY STOP & SOLENOID VALVE

- A. Manufacturers:
 1. American Gas Safety
 2. Substitutions: See Section 01 6000-Product Requirements.
- B. Provide line voltage emergency gas safety shut off button with twist release and clear protective cover.
- C. Provide line voltage gas solenoid valve, line size.
- D. Install valve and safety shut off button per manufacturer's recommendations and instructions.
- E. Coordinate electrical requirements with electrical contractor.

2.08 LINE PRESSURE REGULATORS AND APPLIANCE REGULATORS INDICATORS

- A. Manufacturers:
 1. Maxitrol Company: www.maxitrol.com/#sle.
 2. Fisher
 3. Eaton
 4. Harper Wyman Co
 5. Pietro Fiorentini
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Compliance Requirements:
 1. Appliance Regulator: ANSI Z21.18/CSA 6.3.
 2. Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
- C. Provide with inlet and outlet pressure gage on piping.

- D. Regulator shall be capable of downturn from 10 psi (or max pressure required by Utility Company) to median pressure range of equipment served.
- E. Regulator to be "ventless" where installed indoors, as approved by AHJ.

PART 3 EXECUTION

3.01 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.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Provide support for utility meters in accordance with requirements of utility companies.
- J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- M. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813.
- N. Sleeve pipes passing through partitions, walls and floors.
- O. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Provide copper plated hangers and supports for copper piping.
 - 3. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- P. Underground piping shall be installed with warning tape that states: "WARNING BURIED GAS LINE BELOW." The tape shall be in trench at least 12 inches above the gas piping.

3.02 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Provide regulators at all pieces of equipment in project. Optionally, line regulators can be provided to protect groups of equipment from abnormal conditions that may cause pressure increases, including but not limited to unusual operating conditions of the Utility service regulator.
- C. Provide with drip leg and isolation valve as required by IFGC.
- D. For interior buried applications, utilize pre-sleeved CSST with accessories or provide vented conduit encasement as required by IFGC.

3.03 SERVICE CONNECTIONS

- A. Provide new gas service complete with gas meter and regulators in accordance with local Utility requirements. Gas service distribution piping to have initial minimum pressure indicated on plans.
- B. Contractor is responsible for coordinating new service with Utility, including any elevated pressure requests.

**SECTION 23 3100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ducts.
- B. Flexible ducts.
- C. Single-wall rectangular ducts and fittings.
- D. Single-wall round ducts and fittings.
- E. Sheet metal materials.
- F. Sealants and gaskets.
- G. Hangers and supports.

1.02 RELATED REQUIREMENTS

- A. Division 03 - Concrete
- B. Division 07 - Thermal Moisture Protection: Firestopping
- C. Section 23 0005 - Basic HVAC Requirements
- D. Section 23 0593 - Testing, Adjusting and balancing for HVAC
- E. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- F. Section 23 3300 - Air Duct Accessories.
- G. Section 23 3700 - Air Outlets and Inlets: Fabric air distribution devices.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.
- C. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2023b.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- E. 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; 2023.
- F. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- J. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.
- K. UL 1978 - Grease Ducts; Current Edition, Including All Revisions.
- L. UL 2221 - Tests of Fire Resistive Grease Duct Enclosure Assemblies; Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide data for duct materials, duct connections, and factory fabricated fittings.
- C. Shop Drawings: Submit 1/4 scale, double line shop drawings that indicate duct fittings, duct size, bottom of duct elevations, necessary offsets to accommodate building structure, particulars such as gages, sizes, welds, elevations, all fittings, and configuration prior to start of work for all systems.

1.06 REGULATORY REQUIREMENTS

- A. Construct ductwork to SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; Current Edition including all Addenda.

PART 2 PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCT AND FITTING ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND DUCT AND FITTING ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. McGill AirFlow LLC.
- b. Spiral Manufacturing Co., Inc.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 SEALANTS AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: 3 inches.
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant
 6. Maximum Static-Pressure Class: 10-in wg, positive and negative
 7. Service: Indoor and outdoor
 8. Service Temperature: Minus 40 to plus 200 deg F.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 10. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 11. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

- D. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 7. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- F. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg pressure class, positive or negative.

2.04 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.05 METAL DUCTS

2.06 METAL DUCTS

- A. Material Requirements:
 - 1. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
 - 2. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
 - 3. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - a. Galvanized Coating Designation: G90.
 - b. Finishes for Surfaces Exposed to View: Mill phosphatized.
 - 4. Galvanealed Sheet Steel (FOR EXPOSED, PAINTED DUCTWORK): Comply with ASTM A653-09; hot dipped zinc iron coated steel, annealed, coating designation "A" (A60, A40)
 - 5. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed
 - 6. ducts.
 - 7. Aluminum: ASTM B209/B209M, aluminum sheet, alloy 3003-H14.

8. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
 9. Stainless Steel: ASTM A480/A480M, Type 304 or 316.
 10. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - a. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
 11. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.
- B. Manufactured Ductwork and Fittings:
1. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Fabrication:
1. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
 2. Provide turning vanes in all mitered elbows.
 3. 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.
 4. T's, bends, and elbows: construct according to SMACNA (DCS).
 5. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
 6. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
 7. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
 8. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
- D. Flat-Oval Metal Ducts:
1. Flat-Oval Single Wall Duct: Machine made from a round spiral lock seam duct.
 - a. Fittings: Manufacture at least two gauges heavier metal than the duct.
 - b. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

2.07 FLEXIBLE DUCTS

- A. Flexible Air Ducts:
1. UL 181, Class 1, Black polymer film supported by helically wound spring steel wire.
 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 3. Pressure Rating: From 10 in-wc positive to 1 in-wc negative.
 4. Maximum Velocity: 4,000 fpm.
 5. Temperature Range: Minus 20 to 210 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install products following the manufacturer's instructions.
- C. Comply with safety standards NFPA 90A and NFPA 90B.

- D. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- E. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- F. Install round ducts in maximum practical lengths.
- G. Install ducts with fewest possible joints.
- H. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- I. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- J. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- K. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- L. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- M. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- N. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- O. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
- P. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- Q. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- R. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- S. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with a crimp in the direction of airflow.
- T. Use double nuts and lock washers on threaded rod supports.
- U. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- V. At exterior wall louvers, seal duct to louver frame and install blank-out panels.
- W. Louver Fit-out:
 - 1. Provide blank-out panels sealing available area of wall-mounted exterior-faced louver when connected ductwork is smaller than actual louver free area, and duct outlet is smaller than the louver frame.
 - 2. Use the same duct material painted black on the exterior side, then seal louver frame and duct.

3.02 HANGERS AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.03 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Outdoor, Supply-Air Ducts: Seal Class A.
 - 3. Outdoor, Exhaust Ducts: Seal Class C.
 - 4. Outdoor, Return-Air Ducts: Seal Class C.
 - 5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
 - 6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
 - 7. Unconditioned Space, Exhaust Ducts: Seal Class C.
 - 8. Unconditioned Space, Return-Air Ducts: Seal Class B.
 - 9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
 - 10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
 - 11. Conditioned Space, Exhaust Ducts: Seal Class B.
 - 12. Conditioned Space, Return-Air Ducts: Seal Class C.
 - 13. All locations, Laboratory Exhaust Ducts: Seal Class A.

CLEANING

3.04 CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.
 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 6. Provide drainage and cleanup for wash-down procedures.
 7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.05 FIELD QUALITY CONTROLS

- A. Perform tests and inspections.
- B. Leakage Tests:
1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 3-Inch wg: Test representative duct sections, selected by Architect from sections installed, totaling no less than 25 percent of total installed duct area for each designated pressure class.

- b. Ducts with a Pressure Class 3-Inch wg and less do not need to be tested unless noted otherwise by Engineer in Contract Documents.
3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Keep open ends of ductwork covered during construction.
5. Test for leaks before applying external insulation.
6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give seven days' advance notice for testing.
8. Duct System Cleanliness Tests:
 - a. Visually inspect duct system to ensure that no visible contaminants are present.
 - b. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCAACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - 1) Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
9. Duct system will be considered defective if it does not pass tests and inspections.
10. Prepare test and inspection reports.

3.06 SCHEDULES

- A. Supply Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive 1-inch wg.
 - b. Minimum SMACNA Seal Class: C.
 - c. SMACNA Leakage Class for Rectangular: 12
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- B. Return Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- C. Exhaust Ducts:
 1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: C if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 24.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
- D. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:
 1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 2. Ducts Connected to Air-Handling Units:
 - a. Pressure Class: Positive or negative 2-inch wg.
 - b. Minimum SMACNA Seal Class: B.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
- E. Intermediate Reinforcement:
 1. Stainless-Steel Ducts:
 - a. Exposed to Airstream: Match duct material.

- b. Not Exposed to Airstream: Match duct material.

F. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90 degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90 degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90 degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.

G. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
 - 1) Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - c. Velocity 1000 fpm or Lower: 90-degree tap.
 - d. Velocity 1000 to 1500 fpm: Conical tap.
 - e. Velocity 1500 fpm or Higher: 45-degree lateral.

**SECTION 23 3300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Duct access doors.
- D. Duct test holes.
- E. Fire dampers.
- F. Flexible duct connectors.
- G. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project procedural and administrative requirements.
- B. Division 07 - Thermal and Moisture Protection: Firestopping
- C. Section 23 0005 - Basic HVAC Requirements
- D. Section 23 3100 - HVAC Ducts and Casings.
- E. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- B. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.
- D. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.
- E. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.

1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

- A. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.03 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Access doors with sheet metal screw fasteners are not acceptable.

2.04 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FIRE DAMPERS

- A. Manufacturers:
 - 1. Nailor Industries, Inc: www.nailor.com.
 - 2. NCA, a brand of Metal Industries Inc: www.ncamfg.com.
 - 3. Ruskin Company: www.ruskin.com.
 - 4. United Enertech: www.unitedenertech.com.
 - 5. Greenheck: www.greenheck.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1-inch pressure-class ducts up to 12 inches in height.
- D. Fusible Links: UL 33, separate at 165 degrees F with adjustable link straps for combination fire/balancing dampers.

2.06 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
- C. Maximum Installed Length: 14 inch.

2.07 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
 - 1. Blade: 24 gauge, 0.0239 inch, minimum.
- C. Multi-Blade Damper: Fabricate consisting of opposed blades with maximum blade sizes 8 by 72 inches. Assemble center- and edge-crimped blades in prime-coated or galvanized-channel frame with suitable hardware.
 - 1. Blade: 18 gauge, 0.0478 inch, minimum.
- D. 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.
- E. 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.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size access door for hand and shoulder access, or as indicated on drawings. Provide minimum 4 by 4 inch size access door for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire-rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. 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 two duct widths from duct take-off.
- J. Provide control dampers where shown on drawings and/or control diagrams. Coordinate with Temperature Controls Contractor.
- K. 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.

**SECTION 23 3423
HVAC POWER VENTILATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling exhaust fans.

1.02 RELATED REQUIREMENTS

- A. Section 23 3300 - Air Duct Accessories.
- B. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; 2015.
- B. AMCA 99 - Standards Handbook; 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2016, with Errata (2018).
- 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; 2022.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide data on fans and accessories, including fan curves with specified operating point plotted, power, rpm, sound power levels at rated capacity, and electrical characteristics and connection requirements.

1.05 FIELD CONDITIONS

- A. Request Owner permission to use permanent ventilator(s) for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck Fan Corporation: www.greenheck.com.
- B. Loren Cook Company: www.lorencook.com.
- C. PennBarry, Division of Air System Components: www.pennbarry.com.
- D. Twin City Fan & Blower: www.tcf.com.
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: Comply with AMCA 204.
- B. Performance Ratings: Comply with AMCA 210, bearing certified rating seal.
- C. Sound Ratings: Comply with AMCA 301, tested to AMCA 300, bearing certified sound ratings seal.
- D. Fabrication: Comply with AMCA 99.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 CEILING EXHAUST FANS

- A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing, resiliently mounted motor, gravity backdraft damper in discharge.

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- B. Disconnect Switch: Cord and plug-in housing for thermal overload protected motor.
- 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 reached with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- E. Performance Ratings: As indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
 - 1. Install flexible connections between fan and ductwork; see Section 23 3300. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.
- D. Install backdraft dampers on inlet to roof and wall exhausters.
- E. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

**SECTION 23 3700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
 - 1. Perforated ceiling diffusers.
 - 2. Rectangular ceiling diffusers.
- B. Registers/grilles:
 - 1. Wall-mounted, supply register/grilles.
 - 2. Wall-mounted, exhaust and return register/grilles.
- C. Roof hoods.
- D. Goosenecks.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project procedural and administrative requirements.
- B. Division 09 - Finishes: Painting of ducts and visible behind outlets and inlets.
- C. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General 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.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 DIFFUSERS, REGISTERS, GRILLES MANUFACTURERS

- A. Krueger-HVAC: www.krueger-hvac.com.
- B. Price Industries: www.price-hvac.com.
- C. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com.
- D. Tuttle and Bailey: www.tuttleandbailey.com.
- E. Shoemaker Manufacturing: www.shoemakermfg.com
- F. Duravent (Hart & Cooley): www.hartandcooley.com
- G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square, plaque face diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.
- B. Connections: Round.
- C. Frame: Provide surface mount, snap-in, inverted T-bar, and spline type. In plaster ceilings, provide plaster frame and ceiling frame.

- D. Fabrication: Steel with baked enamel finish.
- E. Color: As indicated.
- F. Accessories: Provide with ceiling radiation damper integral to diffuser.

2.03 PERFORATED FACE CEILING DIFFUSERS

- A. Type: Perforated face with fully adjustable pattern and removable face.
- B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.
- C. Fabrication: Steel with steel frame and baked enamel finish.
- D. Color: As indicated.
- E. Accessories: Provide with ceiling radiation damper integral to diffuser.

2.04 WALL SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, vertical face, single deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- D. Color: As indicated.
- E. Damper: Integral, gang-operated opposed blade type with removable key operator, operable from face.

2.05 WALL EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, vertical face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel frames and blades, with factory baked enamel finish.
- D. Color: As indicated on the drawings.
- E. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.06 ROOF HOODS

- A. Manufacturers:
- B. Fabricate air inlet or exhaust hoods in accordance with SMACNA (DCS).
- C. Fabricate of galvanized steel, minimum 16 gauge, 0.0598 inch base and 20 gauge, 0.0359 inch hood, or aluminum, minimum 16 gauge, 0.0598 inch base and 18 gauge, 0.0598 inch hood; suitably reinforced; with removable hood; birdscreen with 1/2 inch square mesh for exhaust and 3/4 inch for intake, and factory baked enamel finish.
- D. Mount unit on minimum 14 inch high curb base with insulation between duct and curb.
- E. Provide with insect screen and galvanized birdscreen.
- F. Provide with Back

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. Install diffusers to ductwork with air tight connection.

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- D. Provide balancing dampers on duct take-off to diffusers and grilles and registers, despite whether dampers are specified as part of diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black, see Section 09 9123.

**SECTION 23 5400
FURNACES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Forced air furnaces.
- B. Indoor coils.
- C. Thermostats.

1.02 RELATED REQUIREMENTS

- A. Section 23 0713 - Duct Insulation: Duct liner.
- B. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.47 - American National Standard for Gas-Fired Central Furnaces; 2021.
- B. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017, with Addendum (2022).
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers; 2022.
- E. NEMA MG 1 - Motors and Generators; 2021.
- F. NFPA 54 - National Fuel Gas Code; 2021.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- I. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; 2024.
- J. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- E. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- 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 Filters: Two for each furnace. Filters are by contractor, not furnace manufacturer.

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.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

- B. Provide five year manufacturers warranty for heat exchangers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Lennox: www.lennox.com (Basis of Design)
- B. Carrier Corporation, a brand of United Technologies Corporation Building & Industrial Systems: www.carrier.com.
- C. Trane Inc, a subsidiary of Ingersoll Rand: www.trane.com.
- D. Daikin: www.daikin.com

2.02 REGULATORY REQUIREMENTS

- A. Comply with NFPA 70.
- B. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

2.03 GAS FIRED FURNACES

- A. Annual Fuel Utilization Efficiency (AFUE): 0.95 ("condensing") in accordance with ASHRAE Std 103.
- B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating element, controls, air filter, and accessories; wired for single power connection with control transformer.
 - 1. Safety certified by CSA in accordance with ANSI Z21.47.
 - 2. Venting System: Direct.
 - 3. Combustion: Sealed.
 - 4. Air Flow Configuration: Upflow.
 - 5. Heating: Natural gas fired.
 - 6. Accessories:
 - a. Condensate drain.
 - b. Concentric roof termination kit.
- C. Performance:
 - 1. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.
- D. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner. If not certified for combustible flooring, please provide additional steel base.
- E. Primary Heat Exchanger:
 - 1. Material: Hot-rolled steel.
 - 2. Shape: Tubular type.
- F. Secondary Heat Exchanger:
 - 1. Material: Stainless steel.
- G. Gas Burner:
 - 1. Atmospheric type with adjustable combustion air supply.
 - 2. Gas valve provides 100 percent safety gas shut-off; 24 volt combining pressure regulation, safety pilot, manual set (On-Off), pilot filtration, automatic electric valve.
 - 3. Electronic pilot ignition, with electric spark igniter.
 - 4. Combustion air damper with synchronous spring return damper motor.
 - 5. Non-corrosive combustion air blower with permanently lubricated motor.
- H. Gas Burner Safety Controls:
 - 1. Thermocouple sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.
 - 2. Flame rollout switch: Installed on burner box and prevents operation.

3. Vent safety shutoff sensor: Temperature sensor installed on draft hood and prevents operation, manual reset.
4. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- I. Supply Fan: Centrifugal type rubber mounted with direct drive with adjustable variable pitch motor pulley.
- J. Motor:
 1. 1750 rpm multiple speed, permanently lubricated, hinge mounted.
- K. Operating Controls:
 1. Room Thermostat: Cycles burner to maintain room temperature setting.
- L. Accessories: as indicated on plans

2.04 INDOOR COILS

- A. Cabinet:
 1. Insulation: fiberglass
 2. Pre-painted heavy gauge steel.
 3. Outlet Flanges
 4. Coils to exactly match furnace; same letter designation in model number; no adaptors.
- B. Coil:
 1. Aluminum tubing, hairpins, distributor, and header tubes.
 2. Copper refrigerant sweat connections on both liquid and suction lines; braze lines.
 3. Aluminum Fins
 4. Non-corrosive, UV_resistant polymer drain pan with dual fpt drain connections.
 5. High pressure testing
- C. Check/Expansion Valve
 1. Factory-installed, internal check/expansion valves.
 2. Refrigerant: R-410A systems

2.05 THERMOSTATS

- A. Manufacturers: Same as Furnace manufacturer.
- B. Room Thermostat: Low voltage, electric solid state microcomputer based, smart room thermostat with remote sensor:
 1. Preferential rate control to minimize overshoot and deviation from setpoint.
 2. Instant override of setpoint for continuous or timed period from one hour to 31 days.
 3. Programming based on weekdays, Saturday and Sunday.
 4. Thermostat Display:
 - a. Actual room temperature and humidity.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and located correctly.
- C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
- B. Install in accordance with NFPA 90A.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.

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SECTION 23 6313
AIR COOLED REFRIGERANT CONDENSERS

<<<< UPDATE NOTES

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Manufactured units.
- B. Casing.
- C. Condenser coils.
- D. Fans and motors.
- E. Controls.

2.02 RELATED REQUIREMENTS

- A. Section 23 5400 - Furnaces.
- B. Section 23 2300 - Refrigerant Piping.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

2.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.
- B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2022, with Errata (2023).
- C. ASHRAE Std 20 - Methods of Laboratory Testing Remote Mechanical-Draft Air-Cooled Refrigerant Condensers; 2019.
- D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- F. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

2.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical requirements, and wiring diagrams.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loading, required clearances, and location and size of field connections. Include schematic layouts showing condenser, refrigeration compressors, cooling coils, refrigerant piping and accessories required for complete system.
- D. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- E. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

2.05 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.

2.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's installation instruction for rigging, unloading and transporting units.
- B. Protect units on site from physical damage. Protect coils.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. Shall be the same as Furnace.

3.02 MANUFACTURED UNITS

- A. Provide packaged, factory assembled, pre-wired unit, suitable for outdoor use consisting of casing, condensing coil and fans, integral sub-cooling coil liquid accumulator.
- B. Construction and Ratings: In accordance with AHRI 210/240 and UL 207. Testing shall be in accordance with ASHRAE Std 20.
- C. Performance Ratings: Energy Efficient Rating (EER)/Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1 I-P, in combination with compressor units.
- D. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
- E. Provide with factory installed liquid line dryer, high pressure switch, and low pressure switch.

3.03 CASING

- A. House components in welded steel frame with steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.
- C. Provide removable access doors or panels with quick fasteners.

3.04 CONDENSER COILS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Factory tested under high pressure. Entire coil shall be accessible for cleaning.

3.05 FANS AND MOTORS

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge, equipped with roller or ball bearings with grease fittings extended to outside of casing.
- B. Variable speed outdoor coil fan motor with integrated control. Motor shall be totally enclosed.
- C. Constructed of corrosion-resistant PVC coated steel.

3.06 COMPRESSOR

- A. Variable capacity inverter compressor:
 - 1. Top cap thermal sensor switch
- B. Compressor sound dampening system: Polyethylene compressor cover containing 2" thick batt fiberglass insulation. Open edges are sealed with one-inch wide hook and loop fastening tape.
- C. Crankcase heater

3.07 CONTROLS

- A. Provide factory wired and mounted control panel, NEMA 250, containing fan motor starters, fan cycling thermostats, compressor interlock, and control transformer.
- B. Provide controls to permit operation down to 0 degrees F ambient temperature.
- C. Provide thermostat to cycle fan motors in response to outdoor ambient temperature.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Provide connection to refrigeration piping system. Comply with ASHRAE Std 15.
- D. Provide cooling season start-up, winter season shut-down service, for first year of operation.

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- E. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

**SECTION 23 8200
CONVECTION HEATING AND COOLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric cabinet unit heaters.
- B. Electric duct heaters.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project procedural and administrative requirements.
- B. Section 23 0005 - Basic HVAC Requirements
- C. Section 23 3100 - HVAC Ducts and Casings.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

1.03 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Current Edition.
- B. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2022.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
 - 3. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
- D. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- E. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. INDEECO (Industrial Engineering and Equipment Company): www.indeeco.com.
 - 2. Marley Engineered Products: www.marleymep.com.
 - 3. Trane, a brand of Ingersoll Rand: www.trane.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Heating Elements: Provide resistance wire enclosed in steel sheath.
- D. Cabinet: Minimum 18 gage, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
- E. Finish:
 - 1. Factory applied, painted finish.
 - 2. Color: As selected from color chart.
- F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- G. Controls:
 - 1. Thermostat.

2.02 ELECTRIC DUCT HEATERS

- A. Manufacturers:
 - 1. Thermolec
 - 2. Substitutions: See Section 01 6000-Product Requirements.
- B. Construction
 - 1. Frame shall be corrosion-resistant and made of galvanized steel of suitable gauge as required by CSA/UL
- C. Heater
 - 1. Heating coils shall be of High Grade Nickel Chromium alloy and shall be insulated by floating ceramic bushings from the galvanized steel frame. Coil terminals shall be stainless steel, insulated by means of non-rotating ceramic bushings.
- D. Safety Controls
 - 1. Hi-limit with damper shutdown and alarm
 - 2. Low-limit with damper shutdown and alarm
 - 3. High temperature automatic reset thermal cutout that will reset automatically after cool off
 - 4. Manual reset
- E. Standard Built-In Components
 - 1. Fan speed controller
 - 2. Duct Temperature sensor
 - 3. Fan
 - 4. Damper
 - 5. Washable filter
 - 6. Built in Electronic controller (SCR) - ON/OFF components will not be accepted
 - 7. Current sensor available on all units or Wall mounted push button fan control for models 100 cfm
- F. Airflow
 - 1. Built in Temperature Sensor controls the heater proportionally to maintain the pre-set air temperature in the duct
 - 2. Reversible mounting air flow capability
 - 3. Electronic Air Flow sensor available on models below 100 cfm, and a maximum kw's of 3kw on 240/1 or 2.5kw 208/1
- G. Internal Wiring
 - 1. All internal wiring shall terminate on clearly identified terminal blocks.
 - 2. A wiring diagram shall be installed on the control box cover
 - 3. Prior to shipping, all units shall withstand tests as required by CSA/UL.
- H. Mounting Method

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1. Unit must have inlet/outlet collars to accommodate job requirement
2. The unit shall have hanger brackets designed to be used with threaded rods (by others). Spring isolators or other means, may be added to the rods as an option to reduce vibration (by others)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
- C. Do not damage equipment or finishes.
- D. Units with Electric Heating Elements:
 1. Install as indicated including electrical devices furnished by manufacturer but not factory installed.
 2. Install wiring in accordance with the manufacturer's wiring diagram submittal and Section 26 0583.

3.03 FIELD QUALITY CONTROL

- A. Refer to Division 01 - General Requirements for additional requirements.

3.04 CLEANING

- A. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- B. Install new filters.

3.05 PROTECTION

- A. Provide finished cabinet units with protective covers during the balance of construction.

SECTION 26 0005
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. This section applies to all sections of Division 26 and Division 28.
- B. Drawings and general provisions of the contract, including Division 00 and Division 01 specification sections, apply to work of this section.
- C. Provide all items, articles, materials, operations or methods listed, mentioned or scheduled on drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.
- D. The items in this section are supplementary to the requirements set forth in other portions of the specifications as indicated under Item "A" above.

1.02 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

1.03 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

1.04 TEMPORARY FACILITIES

- A. Provide and remove upon completion of the project, in accordance with the general conditions, a complete temporary electrical and telephone service during construction.

1.05 ALTERNATES AND SUBSTITUTIONS

- A. Refer to Division 01 - General Requirements for procedures.

1.06 GUARANTEE

- A. Contractor guarantees that the installation is free from defects and agrees to replace or repair, any part of this installation which becomes defective within a period of one year following final acceptance, unless noted otherwise, provided that such failure is due to defects in the equipment, material or installation or to follow the specifications and drawings. File with the Owner any and all guarantees from the equipment manufacturers.

1.07 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations. Applicable publications listed in all sections of Division 26 shall be the latest issue, unless otherwise noted.

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- B. Rules of local utility companies shall be complied with. Check with the utility company supplying service to the installation and determine all devices including, but not limited to, all current and potential transformers, meter boxes, C.T. cabinets and meters which will be required and include the cost of all such items in proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.08 STANDARDS OF MATERIAL AND WORKMANSHIP:

- A. All materials shall be new, unless noted otherwise. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable standard specifications of the following recognized authorities:
 - 1. A.N.S.I. - American National Standards Institute
 - 2. A.S.T.M. - American Society for Testing Materials
 - 3. I.C.E.A. - Insulated Cable Engineers Association
 - 4. I.E.E.E. - Institute of Electrical and Electronics Engineers
 - 5. N.E.C. - National Electrical Code (NFPA 70)
 - 6. N.E.C.A. - National Electrical Contractors Association
 - 7. N.E.M.A. - National Electrical Manufacturer's Association
 - 8. N.F.P.A. - National Fire Protection Association
 - 9. U.L. - Underwriters Laboratories, Inc.
- B. Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the Trades involved.
- C. All equipment of the same or similar systems shall be by the same manufacturer.

1.09 RECORD DRAWINGS

- A. Refer to Division 01 - General Requirements for procedures. All literature shall be furnished in accordance with requirements listed in Division 01.
- B. Contractor shall provide the following record drawings as part of the Project closeout document process:
 - 1. Contract Documents, specifications and submittals, indicating "As-Built" conditions and actual products selected for use.
 - 2. Product and Maintenance manuals for all equipment listed within this specification manual and in Contract Documents. Provide with parts lists as applicable.

1.10 SUBMITTALS

- A. Refer to Division 01 - General Requirements for procedures.
- B. Contractor shall provide submittals where items are referred to by symbolic designation on the drawings. All submittals shall bear the same designation (light fixtures, wiring devices, etc.). Refer to other sections of the electrical specifications for additional requirements.
- C. Engineer WILL NOT REVIEW:
 - 1. Submittals not specified.
 - 2. Submittals which do not indicate optional equipment being provided.
 - 3. Submittals not reviewed by Contractor; including Contractor stamp with signature comments.
 - 4. Submittals made after work is delivered to site and/or installed.
 - 5. Submittal resubmissions unless resubmission is required by Architect/Engineer.

1.11 MANUFACTURERS LISTED

- A. The listing of specific manufacturers does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed are not relieved from meeting these specifications in their entirety.

- B. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer five (5) days prior to bid date.

1.12 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Do not use Owner's light fixtures for temporary lighting except as allowed and directed by the Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect/Engineer for resolution.
- B. Equipment location shall be as close as practical to locations shown on the drawings.
- C. Working clearances shall not be less than specified in NFPA 70 (National Electric Code).

3.02 COORDINATION

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural and mechanical trades. Remove and relocate any work that causes an interference at Contractor's expense. Disputes regarding the cause of an interference will be resolved by the Construction Manager or Architect/Engineer.

3.03 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to Division 01 - General Requirements and Division 02 - Existing Conditions.
- B. All cutting, patching and repair work shall be performed by the contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.04 EXCAVATION AND BACKFILLING

- A. Provide all excavation, trenching, tunneling, dewatering and backfilling required for the electrical work. Coordinate the work with other excavating and backfilling in the same area.
- B. Where conduit is installed less than 30" below the surface of pavement, provide concrete encasement, 4" minimum coverage, all around or as shown on the electrical drawings.
- C. Backfill all excavations inside building, under drives and parking areas with well-tamped granular material. Backfill all excavations under wall footings with lean mix concrete up to underside of footings and extend concrete within excavation a minimum of four (4) feet each side of footing. Granular backfill shall be placed in layers not more than 8 inches in thickness, 95 percent compaction throughout with approved compaction equipment. Tamp, roll as required. Excavated material shall not be used.
- D. Backfill outside building with granular material to a height 12 inches over top of pipe compacted to 95 percent compaction as specified above. Backfill remainder of excavation with unfrozen, excavated material in such a way to prevent settling. Tamp, roll as required.

3.05 EQUIPMENT FOUNDATION AND SUPPORTS

- A. Shall be as required or as shown on plans or specified.
- B. Provide concrete house keeping bases 4" above finished floor, with leveling channels, where noted, for floor-mounted equipment. Coordinate requirements with Division 03 - Concrete.
- C. For equipment suspended from ceilings or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required.

3.06 EQUIPMENT CONNECTIONS

- A. Make connections to equipment, motors, lighting fixtures, and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the drawings, but called out by the equipment manufacturer's shop drawings shall be provided.

3.07 ACCESS DOORS AND PANELS

- A. Refer to Division 08 - Openings; Provide access doors in locations as required per N.E.C. Coordinate locations with architectural trades.

3.08 CLEANING

- A. Refer to Division 01 - General Requirements; All equipment shall be cleaned as frequently as necessary through the construction process and again prior to project completion.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

3.09 DELIVERY, STORAGE AND PROTECTION OF EQUIPMENT AND MATERIALS

- A. Refer to Division 01 - General Requirements; All equipment and materials shall be delivered, stored and secured per manufacturer's recommendations.
- B. On-site storage shall be coordinated with Construction Manager and be performed in a manner as to avoid damage, deterioration and loss.

3.10 DRAWINGS AND MEASUREMENTS

- A. Electrical drawings are not intended to be scaled for rough-in measurements nor to serve as submittals. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor.

**SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition and extension of existing electrical work.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements.
- C. Section 26 0005 - Basic Electrical Requirements.

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. 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.
- 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 least 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 before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Perform work for removal and disposal of equipment and materials containing toxic substances regulated under the Federal Toxic Substances Control Act (TSCA) in accordance with applicable federal, state, and local regulations. Applicable equipment and materials include, but are not limited to:
 - 1. PCB-containing electrical equipment, including transformers, capacitors, and switches.
 - 2. PCB- and DEHP-containing lighting ballasts.
 - 3. Mercury-containing lamps and tubes, including fluorescent lamps, high intensity discharge (HID), arc lamps, ultra-violet, high pressure sodium, mercury vapor, ignitron tubes, neon, and incandescent.

- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- I. Repair adjacent construction and finishes damaged during demolition and extension work.
- J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

3.04 CLEANING AND REPAIR

- A. See Division 01 - General Requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. 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.

SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.
- H. Cable ties.
- I. Firestop sleeves.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 07 - Thermal and Moisture Protection: Firestopping.
- D. Section 26 0005 - Basic Electrical Requirements.
- E. Section 26 0505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- F. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. 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 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable; 2018.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2021.
- I. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 267 - Outline of Investigation for Wire-Pulling Compounds; Current Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

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. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 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. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. 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.

H. Manufactured wiring systems are not permitted.

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. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- 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.
- I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- J. 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.
 - 3. Color Code:
 - a. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.
 - c. 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.
 - b. Encore Wire Corporation: www.encorewire.com.
 - c. General Cable Technologies Corporation: www.generalcable.com.
 - d. Southwire Company: www.southwire.com.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:

1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Stranded.
 - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 METAL-CLAD CABLE

- A. Manufacturers:
 1. Cerro Wire LLC: www.cerrowire.com.
 2. AFC Cable Systems Inc: www.afcweb.com.
 3. Encore Wire Corporation: www.encorewire.com.
 4. Southwire Company: www.southwire.com.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
 1. Size 10 AWG and Smaller: Stranded.
 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Provide oversized neutral conductors.
- G. Grounding: Full-size integral equipment grounding conductor.
- H. Armor: Steel, interlocked tape.

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 3. 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.
 4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- H. Mechanical Connectors: Provide bolted type or set-screw type.

- I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.06 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.
- B. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Suitable for use at installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.
- D. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

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 not permitted.
 8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.

- E. 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.
- F. 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.
- G. 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.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.
- I. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. 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 contaminants. 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.
- M. 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.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.
- P. 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. Inspect and test in accordance with NETA ATS, except Section 4.
- B. 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.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

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Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

**SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.
- C. Section 26 0005 - Basic Electrical Requirements
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 2. Notify Strategic Energy Solutions, Inc. of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Project Record Documents: Record actual locations of grounding electrode system components and connections.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
 4. Manufacturers - Mechanical and Compression Connectors:
 - a. Advanced Lightning Technology (ALT): www.altfab.com
 - b. Burndy LLC: www.burndy.com
 - c. Harger Lightning & Grounding: www.harger.com
 - d. nVent ERICO; _____: www.nvent.com/
 - e. Thomas & Betts Corporation: www.tnb.com
 5. Manufacturers - Exothermic Welded Connections:
 - a. Burndy LLC: www.burndy.com
 - b. nVent ERICO; Cadweld: www.nvent.com
 - c. thermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- 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. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

**SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

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. Division 01 - General Requirements: Project administrative and procedural requirements
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, and cutting and patching requirements.
- C. Division 03 - Concrete: Concrete equipment pads.
- D. Section 26 0005 - Basic Electrical Requirements
- E. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- F. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- G. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- H. Section 26 5600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of 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 Division 03.

1.05 QUALITY ASSURANCE

- A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.
 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 6. Steel Components: Use corrosion-resistant materials suitable for 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 and clamps suitable for 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 and brackets suitable for boxes to be supported.
1. Manufacturers:
 - a. ABB: www.electrification.us.abb.com
 - b. Eaton Corporation: www.eaton.com
 - c. Emerson Electric Co; O-Z/Gedney: www.emerson.com
 - d. HoldRite, a brand of Reliance Worldwide Corporation: www.holdrite.com
 - e. nVent; Caddy: www.nvent.com
- D. Metal Channel/Strut Framing Systems:
1. Manufacturers:
 - a. ABB: www.electrification.us.abb.com/#sle.
 - b. Atkore International Inc; Unistrut: www.unistrut.us/#sle.
 - c. Eaton Corporation: www.eaton.com/#sle.
 2. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 3. Comply with MFMA-4.
 4. Channel/Strut Used as Raceway, Where Indicated: Listed and labeled as complying with UL 5B.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2-inch diameter.
 - b. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch diameter.
 - c. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8-inch diameter.
 - e. Outlet Boxes: 1/4-inch diameter.
 - f. Luminaires: 1/4-inch diameter.

- F. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
 - 1. Manufacturers:
 - a. Atkore International Inc; Unistrut: www.unistrut.us/#sle.
 - b. Eaton Corporation: www.eaton.com/#sle.
 - c. nVent; Caddy: www.nvent.com/#sle.
 - d. PHP Systems/Design: www.phpsd.com/#sle.
 - 2. Description: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring attachment to roof structure and not penetrating roofing assembly, with support fixtures as specified.
 - 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 - 5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- G. Anchors and Fasteners:
 - 1. Manufacturers - Mechanical Anchors:
 - a. Dewalt: anchors.dewalt.com
 - b. Hilti, Inc: www.hilti.com
 - c. ITW Red Head, a division of Illinois Tool Works, Inc: www.itwredhead.com
 - d. Simpson Strong-Tie Company Inc: www.strongtie.com
 - 2. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- 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.
 - 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 4 inch high concrete pad constructed in accordance with Division 03.
 - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: See Section 26 0533.13 for additional requirements.
- I. Box Support and Attachment: See Section 26 0533.16 for additional requirements.
- J. Interior Luminaire Support and Attachment: See Section 26 5100 for additional requirements.
- K. Exterior Luminaire Support and Attachment: See Section 26 5600 for additional requirements.

- L. Secure fasteners in accordance with manufacturer's recommended torque settings.
- M. Remove temporary supports.
- N. Identify independent electrical component support wires above accessible ceilings, where permitted, with color distinguishable from ceiling support wires in accordance with NFPA 70.

3.02 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- 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 support and attachment components.

**SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Galvanized steel electrical metallic tubing (EMT).
- E. Aluminum electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Sleeve and Sleeve Seals

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 07 - Thermal and Moisture Protection: Firestopping.
- D. Section 26 0005 - Basic Electrical Requirements
- E. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.
- F. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- G. Section 26 0529 - Hangers and Supports for Electrical Systems.
- H. Section 26 0533.16 - Boxes for Electrical Systems.
- I. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- J. Section 28 4600 - Fire Detection and Alarm: Fire alarm wiring in conduit.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2020.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A); 2020.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2020.
- F. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
- G. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2017.
- H. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- I. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit; 2018.
- J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2020.
- K. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2021.
- L. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- M. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- N. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- O. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- P. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- Q. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- R. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- S. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel; Current Edition, Including All Revisions.
- T. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Concealed Within Masonry Walls: Use intermediate metal conduit (IMC) or electrical metallic tubing (EMT).
- D. Concealed Within Hollow Stud Walls: Use intermediate metal conduit (IMC) or electrical metallic tubing (EMT).
- E. Concealed Above Accessible Ceilings: Use intermediate metal conduit (IMC) or electrical metallic tubing (EMT).
- F. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- G. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, aluminum rigid metal conduit, or electrical metallic tubing (EMT).
- H. Exposed, Interior, Subject to Physical Damage: Use stainless steel rigid metal conduit (RMC), aluminum rigid metal conduit (RMC), stainless steel intermediate metal conduit (IMC), stainless steel electrical metallic tubing (EMT), or schedule 80 rigid PVC conduit.
- I. Exposed, Interior, Subject to Severe Physical Damage: Use stainless steel rigid metal conduit (RMC), aluminum rigid metal conduit (RMC), or stainless steel intermediate metal conduit (IMC).
- J. Exposed, Exterior: Use PVC-coated galvanized steel rigid metal conduit or aluminum rigid metal conduit.
- K. Exposed, Exterior, Subject to Severe Physical Damage: Use stainless steel rigid metal conduit (RMC) or stainless steel intermediate metal conduit (IMC).
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use intermediate metal conduit (IMC).
- M. Flexible Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit (FMC).
 - 1. Maximum Length: 6 feet.
- N. Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit (FMC).

2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
3. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- O. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC) or galvanized steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.
- C. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- D. Provide products listed, classified, and labeled as suitable for purpose intended.
- E. Minimum Conduit Size, Unless Otherwise Indicated:
 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 2. Flexible Connections to Luminaires: 3/8-inch trade size.
- F. 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. Manufacturers:
 1. AFC Cable Systems, Inc.
 2. Alflex Inc.
 3. Allied Tube & Conduit: www.alliedeg.com
 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 5. Electri-Flex Co.
 6. Manhattan/CDT/Cole-Flex.
 7. Maverick Tube Corporation.
 8. O-Z Gedney; a unit of General Signal.
 9. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc.
 2. Alflex Inc.
 3. Allied Tube & Conduit: www.alliedeg.com
 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 5. Electri-Flex Co.
 6. Manhattan/CDT/Cole-Flex.
 7. Maverick Tube Corporation.
 8. O-Z Gedney; a unit of General Signal.
 9. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com

- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
 - 1. Manufacturers:
 - a. ABB; T&B: www.electrification.us.abb.com/#sle.
 - b. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.us/#sle.
 - c. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
 - d. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
 - 2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
 - 3. Material: Use aluminum.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit: www.alliedeg.com
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. 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.
- 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.

2.06 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit: www.alliedeg.com
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. Description: NFPA 70, Type EMT galvanized 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.
 - 4. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.

2.07 ALUMINUM ELECTRICAL METALLIC TUBING (EMT)

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Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit: www.alliedeg.com
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com
- B. Description: NFPA 70, Type EMT aluminum electrical metallic tubing listed and labeled as complying with UL 797A.
- C. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; listed for use with aluminum EMT.
 - 2. Material: Use aluminum.
 - 3. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Elec
 - 3. Amco Corporation.
 - 4. Cantex Inc: www.cantexinc.com
 - 5. CertainTeed Corp.; Pipe & Plastics Group.
 - 6. Condux International, Inc.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan
 - 11. RACO; a Hubbell Company.
 - 12. Thomas & Betts Corporation.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
 - 3. Below Grade Long Radius Elbows:
 - a. Conduits 2 inches to 2.5 inches: use minimum 24-inch radius, fiberglass or GRC elbow.
 - b. Conduits larger than 2.5 inches; use minimum 36-inch radius fiberglass or GRC elbow.

2.09 SLEEVE AND SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.

4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Sealing Elements: EPDM (Ethylene-propylene-diene terpolymer rubber) or NBR (Acrylonitrile-butadiene rubber) interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure plates: Plastic or carbon steel or stainless steel. Include two for each sealing element.
 3. Connecting bolts and nuts: Carbon steel with corrosion-resistant coating or stainless steel of length required to secure pressure plates to sealing elements. Include one of each sealing element.
- C. Grout: Nonmetallic, shrinkage-resistant grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.10 ACCESSORIES

- A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
- B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- C. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.
- D. Foam Conduit Sealant:
 1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 3. Rated to hold minimum of 10 ft water head pressure.
- E. Conduit Mechanical Seals:
 1. Listed as complying with UL 514B.
 2. Specifically designed for sealing conduit openings against water, moisture, gases, and dust.
 3. Suitable for sealing around conductors/cables to be installed.
- F. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.
- G. Sealing Systems for Concrete Penetrations:
 1. Sleeves: Provide water stop ring or cement coating that bonds to concrete to prevent water infiltration.
 2. Rate for minimum of 40 psig; suitable for sealing around conduits to be installed.
- H. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- I. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that 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. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. 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 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.
 - 5. Unless otherwise approved, do not route exposed conduits:
 - 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 equivalent of four 90-degree bends between pull points.
 - 8. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 9. Group parallel conduits in same area on common rack.
- G. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 0529.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 5. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 6. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
 - 7. Use of wire for support of conduits is not permitted.
- H. 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. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 - 6. Secure joints and connections to provide mechanical strength and electrical continuity.
- I. Penetrations:

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Lansing, Michigan

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.
 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 6. 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.
 7. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07.
- J. 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 calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- K. Conduit Sealing:
1. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- L. Provide grounding and bonding; see Section 26 0526.
- M. Identify conduits; see Section 26 0553.

3.03 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.

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 03 - Concrete: Concrete.
- C. Division 07 - Thermal and Moisture Protection: Firestopping.
- D. Division 08 - Openings: Access Doors.
- E. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- F. Section 26 0005 - Basic Electrical Requirements.
- G. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- H. Section 26 0529 - Hangers and Supports for Electrical Systems.
- I. Section 26 0533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- J. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- K. 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; 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013 (Reaffirmed 2020).
- 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 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

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Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and floor boxes.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, and cabinets and enclosures.
- 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. Keys for Lockable Enclosures: Two of each different key.

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.
 13. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com
 - d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com
 - e. Thomas & Betts Corporation: www.tnb.com
- 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.
 - b. Boxes 6 square feet and Larger: Provide sectionalized screw-cover or hinged-cover enclosures.
 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Comply with UL 50 and NEMA 250, Type 1 for indoor dry locations and Type 4 for wet and outdoor locations with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1) Metal enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2) Interior panels: Steel; all sides finished with manufacturer's standard enamel.
 - b. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - c. Back Panels: Painted steel, removable.
 - d. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
 5. Steel surface-mount boxes for finished spaces (only where specified): NEMA OS1, cast, bell-box style, no visible knockouts, no holes, no gaps, no sharp edges, smooth, size to match flush faceplate dimensions.
 6. Stainless steel surface-mount boxes (only where specified): NEMA OS1, cast stainless steel bell-box style for finished spaces, no visible knockouts, no holes, no gaps, no sharp edges, smooth, size to match flush faceplate dimensions.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Division 08 as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - 3. Locate boxes as required for devices installed under other sections or by others.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 - 7. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - 8. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
- I. 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.
- J. Install boxes plumb and level.
- K. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- L. Install boxes as required to preserve insulation integrity.
- M. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- N. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- O. Close unused box openings.
- P. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- Q. Provide grounding and bonding in accordance with Section 26 0526.

3.03 PROTECTION

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- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

SECTION 26 0533.23
SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface raceway systems.
- B. Wireways.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0533.13 - Conduit for Electrical Systems.
- G. Section 26 0533.16 - Boxes for Electrical Systems.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 2726 - Wiring Devices: Receptacles.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- D. NEMA PRP 5 - Installation Guidelines for Surface Nonmetallic Raceway; 2021.
- E. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of raceways with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate rough-in locations of outlet boxes provided under Section 26 0533.16 and conduit provided under Section 26 0533.13 as required for installation of raceways provided under this section.
 - 3. Verify minimum sizes of raceways with the actual conductors and components to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install raceways until final surface finishes and painting are complete.
 - 2. Do not begin installation of conductors and cables until installation of raceways is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.

1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.

PART 2 PRODUCTS

2.01 RACEWAY REQUIREMENTS

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

2.02 SURFACE RACEWAY SYSTEMS

- A. Manufacturers:
 1. Hubbell Incorporated: www.hubbell.com
 2. Legrand North America, Inc: www.legrand.us/#sle.
 3. MonoSystems, Inc: www.monosystems.com
 4. Wiremold, a brand of Legrand North America, Inc: www.legrand.us

2.03 WIREWAYS

- A. Manufacturers:
 1. Cooper B-Line, a division of Cooper Industries: www.cooperindustries.com
 2. Enduro Composites: www.endurocomposites.com
 3. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com
 4. Schneider Electric; Square D Products: www.schneider-electric.us
- B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4 or Type 12 as required and sized according to NFPA 70..
- C. Wireway Type, Unless Otherwise Indicated:
 1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel with screw-cover.
 2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw-cover; include provision for padlocking. Listed and labeled as defined by NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- E. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.
- F. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.
- C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Surface Nonmetallic Raceways: Install in accordance with NEMA PRP 5.
- D. Install raceways plumb and level.

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- E. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.
- F. Secure and support raceways in accordance with Section 26 0529 at intervals complying with NFPA 70 and manufacturer's requirements.
- G. Close unused raceway openings.
- H. Provide grounding and bonding in accordance with Section 26 0526.

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Floor marking tape.
- F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 09 - Finishes: Interior and Exterior Painting.
- C. Section 26 0005 - Basic Electrical Requirements
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- E. Section 26 2726 - Wiring Devices: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

- A. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 FIELD CONDITIONS

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Enclosed switches and circuit breakers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.

3. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
 4. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
 5. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
 - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 09 9123 and 09 9113.
- C. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- D. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
 2. Use voltage markers, color-coded bands, or factory-painted conduits to identify systems other than normal power system for accessible conduits.
 - a. Maximum Intervals: 20 feet.
 - b. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
 - 1) Field-Painting: Comply with Section 09 9123 and 09 9113.
 - 2) Vinyl Color Coding Electrical Tape: Comply with Section 26 0519.
 3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
 4. Use underground warning tape to identify underground raceways.
 5. Use voltage markers to identify highest voltage present for wireways at maximum intervals of 20 feet.
- E. Identification for Boxes:
1. Use voltage markers to identify highest voltage present.
 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Division 09 per the same color code used for raceways.
- F. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
 2. Use identification label to identify fire alarm system devices.
 - a. For devices concealed above suspended ceilings, provide additional identification on ceiling tile below device location.
 3. Use identification label to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
- G. Identification for Luminaires:
1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Manufacturers:
 - a. Brimar Industries, Inc: www.brimar.com/#sle.
 - b. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.

- c. Seton Identification Products: www.seton.com/#sle.
 2. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Manufacturers:
 - a. Brady Corporation: www.bradyid.com/#sle.
 - b. Brother International Corporation: www.brother-usa.com/#sle.
 - c. Panduit Corp: www.panduit.com/#sle.
 2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 1/2 inch.
 5. Color: Black text on yellow background unless otherwise indicated.
- D. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Power source and circuit number or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Black text on clear background.
- E. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
 2. Legend: Designation indicated and device zone or address.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch.
 5. Color: Red text on white background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 - 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 - 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
- E. Color: Black text on orange background unless otherwise indicated.

2.05 FLOOR MARKING TAPE

- A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlamine, 3 inches wide, with alternating black and white stripes.

2.06 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.
 - 9. Conductors and Cables: Legible from the point of access.

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10. Devices: Outside face of cover.

- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Secure rigid signs using stainless steel screws.
- G. Mark all handwritten text, where permitted, to be neat and legible.

SECTION 26 0935
DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Distributed Digital Lighting Control System
- B. Digital Load Controllers (Room and Fixture Controllers)
- C. Digital Wall or Ceiling Mounted Occupancy Sensor
- D. Digital Wall Switch Occupancy Sensors
- E. Digital Wall Switches

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Section 26 0005 - Basic Electrical Requirements.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.13 - Conduit for Electrical Systems.
- E. Section 26 0533.16 - Boxes for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems.
- G. Section 26 2726 - Wiring Devices.
- H. Section 26 5100 - Interior Lighting.
- I. Section 26 5600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. FCC Article 15, Section J, Class A.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- C. NEMA WD 7 - Occupancy Motion Sensors Standard; Current Edition.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most recent edition adopted by Authority Having Jurisdiction, including all applicable Amendments and Supplements.
- F. UL 508 - Standard for Industrial Control Equipment; Current Edition, including all Revisions.
- G. UL 916 - Standard for Energy Management Equipment; Current Edition, including all Revisions.
- H. UL 924 - Standard for Emergency Lighting and Power Equipment
- I. UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products Installed in Air-Handling Spaces.

1.04 DESIGN / PERFORMANCE REQUIREMENTS

- A. Digital lighting control system shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.
- B. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 - General Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Catalog sheets and specifications.

2. Ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 3. Storage and handling requirements and recommendations.
 4. Installation instructions.
- C. Shop Drawings: Wiring diagrams a for the various components of the System specified including:
1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
 2. Show location of all devices, including at minimum sensors, load controllers, and switches/dimmers for each area on reflected ceiling plans.
 3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
 4. Network riser diagram including floor and building level details. Include network cable specification. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals:
1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
 2. Operation and Maintenance Manual:
 - a. Include approved Shop Drawings and Product Data.
 - b. Include Sequence of Operation, identifying operation for each room or space.
 - c. Include manufacturer's maintenance information.
 - d. Operation and Maintenance Data: Include detailed information on device programming and setup.
 - e. Include startup and test reports.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing of centralized and distributed lighting control systems with a minimum of 10 years documented experience.
- B. Installer Qualifications: Company certified by the manufacturer and specializing in installation of networked lighting control products with minimum three years documented experience.
- C. System Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.

1.07 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to commencing Work of this section. Meeting to be attended by Contractor, Architect, system installer, factory authorized manufacturer's representative, and representative of all trades related to the system installation.
- B. Review installation procedures and coordination required with related Work and the following:
 1. Confirm the location and mounting of all devices, with special attention to placement of switches, dimmers, and any sensors.
 2. Review the specifications for low voltage control wiring and termination.
 3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.
 4. Discuss requirements for integration with other trades
- C. Inspect and make notes of job conditions prior to installation:
 1. Record minutes of the conference and provide copies to all parties present.
 2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.
 3. Installation shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 - 1. Ambient temperature: 32 to 104 degrees F (0 to 40 degrees C).
 - 2. Relative humidity: Maximum 90 percent, non-condensing.

1.09 WARRANTY

- A. Manufacturer shall provide a 5 year limited warranty on products within this installation, except where otherwise noted, and consisting of a one for one device replacement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Lutron
 - 2. Wattstopper (Legrand)
 - 3. Eaton Greengate
 - 4. nLight (Acuity Brands)
 - 5. Crestron
 - 6. Leviton
 - 7. Enlighted (Siemens)
 - 8. Touche Lighting Control
 - 9. Engineer pre-approved equal.

2.02 DISTRIBUTED DIGITAL LIGHTING CONTROL SYSTEM

- A. System General: Provide digital lighting control system complete with all necessary enclosures, wiring, and system components to ensure a complete and properly functioning system as indicated on the Drawings and specified herein. If a conflict is identified, between the Drawing, this specification, contact the Engineer for clarification prior to proceeding.
 - 1. Space Control Requirements: Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality as indicated in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, classroom, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
 - 2. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four preset lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to turn off all lighting in the space. Spaces with up to four moveable walls shall include controls that can be reconfigured when the room is partitioned.
- B. Equipment Required: Lighting Control and Automation system as defined under this section covers the following equipment.
 - 1. Digital Lighting Management (DLM) local network: Free topology, plug-in wiring system for power and data to room devices.
 - 2. Digital Fixture Controllers: Self-configuring, digitally addressable one relay fixture-integrated controllers for on/off/0-10V dimming control.
 - 3. Digital Occupancy Sensors: Self-configuring, digitally addressable, calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 - 4. Digital Switches: Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
- C. Local Network: Digital lighting control local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.

1. Features of the digital lighting control local network include:
 - a. Automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
 - b. Simple replacement of any device in the local digital lighting control network with a standard off the shelf unit without requiring significant commissioning, configuration or setup.
 - c. Ability to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
 - d. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.
2. Digital room devices connect to the local network using pre-terminated low voltage cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.
3. If manufacturer's pre-terminated low voltage cables are not used for the installation each cable must be individually tested and observed by authorized service representative following installation.
4. Provide input from fire alarm system. Upon receipt of signal from fire alarm system the lighting control system shall override all lighting controls and provide full illumination to all emergency fixtures along the path of egress for a minimum of 90 minutes or until fire alarm system is reset.

2.03 DIGITAL LOAD CONTROLLERS (ROOM AND FIXTURE CONTROLLERS)

- A. Digital Load Controllers: Digital controllers for lighting zones, fixtures and/or plug loads automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements. Controllers are simple to install, and do not have dip switches/potentiometers, or require special configuration for standard applications. Control units include the following features
 1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
 2. Simple replacement using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf device.
 3. Multiple room controllers connected together in a local network must automatically arbitrate with each other, without requiring any configuration or setup, so that individual load numbers are assigned starting with load 1 to a maximum of 64, assigned based on each controller's device ID's from highest to lowest.
 4. Device Status LEDs to indicate:
 - a. Data transmission
 - b. Device has power
 - c. Status for each load
 - d. Configuration status
 5. Quick installation features including:
 - a. Standard junction box mounting
 - b. Quick low voltage connections using standard RJ-45 patch cable
 6. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:
 - a. Turn on to 100 percent
 - b. Turn off
 - c. Turn on to last level
 7. Each load be configurable to operate in the following sequences based on occupancy:
 - a. Auto-on/Auto-off (Follow on and off)
 - b. Manual-on/Auto-off (Follow off only)

8. Polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.
 9. UL 2043 plenum rated
 10. Manual override and LED indication for each load
 11. Zero cross circuitry for each load
 12. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
 13. Dimming Room Controllers shall share the following features:
 - a. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
 - b. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
 - c. The following dimming attributes may be changed or selected using a wireless configuration tool:
 - 1) Establish preset level for each load from 0-100 percent
 - 2) Set high and low trim for each load
 - 3) Initiate lamp burn in for each load of either 0, 12 or 100 hours
 - d. Override button for each load provides the following functions:
 - 1) Press and release for on/off control
 - 2) Press and hold for dimming control
 - e. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver. LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
 - f. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100 percent dimming range defined by the minimum and maximum calibration trim.
 - g. Calibration and trim levels must be set per output channel. Devices that set calibration or trim levels per controller (as opposed to per load) are not acceptable.
 - h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.
- B. Fixture Controllers shall include
1. A form factor and product ratings to allow various OEM fixture manufacturers to mount the device inside the ballast/driver cavity of standard-sized fluorescent or LED general lighting fixtures.
 2. One 3A 120/277V rated mechanically held relay.
 3. Programmable behavior on power up following the loss of normal power:
 - a. Turn on to 100 percent
 - b. Turn off
 - c. Turn on to last level
 4. Requirement for 7 mA of 24VDC operating power from the digital lighting control local network.
 5. Fixture Controller does not require a connection to a neutral conductor to operate, and unlike other types of Load Controllers it does not contribute power to the digital lighting control local network to drive accessory devices.
 6. Power to drive the fixture controller electronics can come from any room controller
 7. 0-10V dimming capability via a single 0-10 volt analog output from the device for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Fixture Controller.
 8. Connect to a single or dual RJ-45 adaptor with 24 inch leads. Single adaptor mounts in a 1/2 inch KO and dual adaptor in a 2.2 by 1.32 inch rectangular hole for connection to the digital lighting control local network.

9. Adaptor leads are insulated for use in a fixture cavity, and the lead length allows the OEM fixture manufacturer flexibility to position the Fixture Controller and the RJ45 jack in the best locations on each fixture.
10. A complete set of dimming features described above in the paragraph detailing On/Off/Dimming Enhanced Room Controllers.

2.04 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR

- A. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
 1. Digital calibration and pushbutton configuration for the following variables:
 - a. Sensitivity, 0-100 percent in 10 percent increments
 - b. Time delay, 1-0 minutes in 1 minute increments
 - c. Test mode, Five second time delay
 - d. Detection technology, PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 2. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the digital lighting control local network.
 3. Programmable control functionality including:
 - a. Each sensor may be programmed to control specific loads within a local network.
 - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
 - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
 - d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - e. Ultrasonic and Passive Infrared
 - f. Ultrasonic or Passive Infrared
 - g. Ultrasonic only
 - h. Passive Infrared only
 - i. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
 4. One or two RJ-45 port(s) for connection to digital lighting control local network.
 5. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
 6. Device Status LEDs, which may be disabled for selected applications, including:
 - a. PIR detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
 7. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
 8. Manual override of controlled loads.
 9. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
- B. Units shall not have any dip switches or potentiometers for field settings
- C. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology digital lighting control local network. No additional configuration will be required.

2.05 DIGITAL WALL SWITCH OCCUPANCY SENSORS

- A. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton configuration for the following variables:
 - a. Sensitivity: 0-100 percent in 10 percent increments
 - b. Time delay: 1-30 minutes in 1 minute increments
 - c. Test mode: Five second time delay
 - d. Detection technology: PIR, Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 - f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the digital lighting control local network.
 2. Programmable control functionality including:
 - a. Each sensor may be programmed to control specific loads within a local network.
 - b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
 - c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.
 - d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
 - 1) Ultrasonic and Passive Infrared
 - 2) Ultrasonic or Passive Infrared
 - 3) Ultrasonic only
 - 4) Passive Infrared only
 3. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
 4. Two RJ-45 ports for connection to digital lighting control local network.
 5. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.
 6. Device Status LEDs including
 - a. PIR detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
 7. Assignment of any occupancy sensor to a specific load within the room without wiring or special tools.
 8. Assignment of local buttons to specific loads within the room without wiring or special tools
 9. Manual override of controlled loads
 10. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.
- B. Units shall not have any dip switches or potentiometers for field settings.
- C. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology digital lighting control local network. No additional configuration will be required.
- D. Two-button wall switch occupancy sensors, when connected to a single relay dimming room or fixture controller, shall operate in the following sequence as a factory default:
1. Left button
 - a. Press and release - Turn load on
 - b. Press and hold - Raise dimming load
 2. Right button
 - a. Press and release - Turn load off
 - b. Press and hold - Lower dimming load
- E. Low voltage momentary pushbuttons shall include the following features:
1. Load/Scene Status LED on each switch button with the following characteristics:

- a. Bi-level LED
- b. Dim locator level indicates power to switch
- c. Bright status level indicates that load or scene is active
2. The following button attributes may be changed or selected using a wireless configuration tool:
 - a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
 - b. Individual button function may be configured to Toggle, On only or Off only.
 - c. Individual scenes may be locked to prevent unauthorized change.
 - d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 - e. Ramp rate may be adjusted for each dimmer switch.
 - f. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.

2.06 DIGITAL WALL SWITCHES

- A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 6 button configuration. Wall switches shall include the following features:
 1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
 2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
 3. Configuration LED on each switch that blinks to indicate data transmission.
 4. Load/Scene Status LED on each switch button with the following characteristics:
 - a. Bi-level LED
 - b. Dim locator level indicates power to switch
 - c. Bright status level indicates that load or scene is active
 - d. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
 5. Programmable control functionality including:
 - a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority
 - b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
 6. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.
- B. Two RJ-45 ports for connection to digital lighting control local network.
- C. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology digital lighting control local network. No additional configuration shall be required to achieve multi-way switching.
- D. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa.
 1. Individual button function may be configured to Toggle, On only or Off only.
 2. Individual scenes may be locked to prevent unauthorized change.
 3. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
 4. Ramp rate may be adjusted for each dimmer switch.
 5. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until measurements have been verified and work areas have been properly prepared.
- B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that required pre-installation meeting specified in Part 1 of this specification has been completed, recorded meeting minutes have been distributed and all outstanding issues noted have been resolved prior to the start of installation.

3.02 INSTALLATION

- A. Install system in accordance with the approved system shop drawings and manufacturer's instructions.
- B. All wiring associated with the specified controls system shall be installed within conduit or conduits unless otherwise indicated on the Drawings. Refer to 26 0533.13 - Conduit for Electrical Systems for requirements.
- C. Install all room/area devices using manufacturer's factory-tested low voltage cable with pre-terminated RJ-45 connectors.
 - 1. If pre-terminated cable is not used for room/area wiring, each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the Work.
 - 2. If fixtures have internal digital lighting control Control Modules, ensure that they are also connected with low voltage cable.
 - 3. Install all room to room network devices using manufacturer-supplied network wire or wireless devices. Network wire substitution is not permitted and may result in loss of product warranty.
 - 4. Low voltage wiring topology must comply with manufacturer's specifications.
 - 5. Route network wiring as indicated on the Drawings as closely as possible. Document final wiring location, routing and topology on as built drawings.
 - 6. All lighting control low voltage wiring jacket colors shall be coordinated with and approved by Owner.
 - a. If there is no selection provided by Owner, jacket color shall be yellow.
- D. All line voltage connections shall be tagged to indicate circuit and switched legs.
- E. Test all devices to ensure proper communication.
- F. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.
- G. Provide written or computer-generated documentation on the configuration of the system including room by room description including:
 - 1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - 2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 - 3. Load Parameters (e.g. blink warning, etc.)
- H. Post start-up tuning - Adjust sensor time delays and sensitivities to meet the Owner's requirements 30 days from beneficial occupancy. Provide a detailed report to the Architect / Owner of post start-up activity.
- I. Tighten all panel Class I conductors from both circuit breaker and to loads to torque ratings as marked on enclosure UL label.
- J. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.
- K. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.
- L. Verify all non-panel-based lighting loads to be free from short circuits prior to connection to room controllers.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Notify Engineer and Manufacturer in writing a minimum of 3 weeks prior to system start-up and testing.
- B. Tests and Inspections: Manufacturer's service representative shall perform the following inspections and prepare reports.
 - 1. Verify Class I and II wiring connections are terminated properly by validating system performance.
 - 2. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
 - 3. Verify / complete task programming for all switches, dimmers, time clocks, and sensors.
 - 4. Verify that the control of each space complies with the Sequence of Operation.
 - 5. Correct any system issues and re-test.
- C. Provide a report in table format with drawings, or using a software file that can be opened in the manufacturer's system software including each room or space that has lighting control installed. Indicate the following:
 - 1. Date of test or inspection.
 - 2. Loads per space, or Fixture Address identification.
 - 3. Quantity and Type of each device installed
 - 4. Reports providing each device's settings.

3.04 DEMONSTRATION AND TRAINING

- A. Before Substantial Completion, arrange and provide a one-day Owner instruction period to designated Owner personnel. Set-up, starting of the lighting control system and Owner instruction includes:
 - 1. Confirmation of entire system operation and communication to each device.
 - 2. Confirmation of operation of individual relays, switches, and sensors.
 - 3. Confirmation of system Programming, photocell settings, override settings, etc.
 - 4. Provide training to cover installation, programming, operation, and troubleshooting of the lighting control system.

3.05 PRODUCT SUPPORT AND SERVICE

- A. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

**SECTION 26 2416
PANELBOARDS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 26 4300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e, with Amendments (2022).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 1000 Volts or Less; 2023.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- 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.
- N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- O. UL 1699 - Arc-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

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2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. 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.
 1. Include documentation of listed series ratings as indicated in Section 26 0573.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. Panelboard Keys: Two of each different key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com
- B. Eaton Corporation: www.eaton.com
- C. Schneider Electric; Square D Products: www.schneider-electric.us
- D. Siemens Industry, Inc: www.usa.siemens.com
- 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.
 - b. Panelboards Containing Fusible Switches: Between -22 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:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 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.
 1. Provide Surge Protective Devices internally mounted within all panels which are specified as part of the Emergency distribution power system.
- L. Load centers are not acceptable.

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: Aluminum, suitable for terminating aluminum or copper conductors.
 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: Aluminum.
 3. Ground Bus Material: Aluminum.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Provide clear plastic circuit directory holder mounted on inside of door.

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:

- 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
- 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. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Combination type listed as complying with UL 1699.
 - d. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.
9. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 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. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 1. Fire detection and alarm circuits.

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2. Intrusion detection and access control system circuits.
3. Video surveillance system circuits.

3.03 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. 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 225 amperes. Tests listed as optional are not required.
- C. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
- D. Test GFCI circuit breakers to verify proper operation.
- E. Test AFCI circuit breakers to verify proper operation.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

**SECTION 26 2726
WIRING DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates and covers.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- E. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- F. Section 26 0533.16 - Boxes for Electrical Systems.
- G. Section 26 0533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- H. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- I. Section 26 0935 - Distributed Digital Lighting Control System: Devices for automatic control of lighting, including occupancy sensors, in-wall switches and timers.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification); 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2021.
- 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 1310 - Class 2 Power Units; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
 6. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for receptacles installed in areas listed below:
1. All 15 and 20-ampere 125 and 250-volt nonlocking type receptacles in the areas listed below shall be listed tamper-resistant receptacles, unless otherwise excluded in NEC.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Provide GFCI protection for receptacles installed in kitchens.
- G. Provide GFCI protection for receptacles serving electric drinking fountains.
1. Outlet shall be readily accessible.
- H. Provide GFCI protection for outlets serving vending machines. Outlets shall be readily accessible.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with stainless steel 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.

2.04 RECEPTACLES

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell.com
 2. Leviton Manufacturing Company, Inc: www.leviton.com
 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

- 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. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 - 2. Tamper Resistant and Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; 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: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.
 - 4. Tamper Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
- E. USB Charging Devices:
 - 1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
 - a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
 - 2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

2.05 WALL PLATES AND COVERS

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com
 - 3. Lutron Electronics Company, Inc: www.lutron.com
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
 - 5. Source Limitations: Where wall controls are furnished as part of lighting control system, provide accessory matching receptacles and wallplates by the same manufacturer in locations indicated.
- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Receptacle Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

- E. Weatherproof Receptacle Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

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: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. 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.
 - 3. 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.
- 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. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- 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.
- N. Identify wiring devices in accordance with Section 26 0553.

3.04 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch and wall dimmer with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

**SECTION 26 2816.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Section 26 0005 - Basic Electrical Requirements.
- C. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- D. Section 26 0529 - Hangers and Supports for Electrical Systems.
- E. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 26 0573 - Power System Studies: Additional criteria for the selection of equipment and associated protective devices specified in this section.
- G. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems; 2021.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- I. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com
- B. Eaton Corporation: www.eaton.com
- C. Schneider Electric; Square D Products: www.schneider-electric.us

D. Siemens Industry, Inc: www.usa.siemens.com

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- J. 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:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
- K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- L. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.
 - a. Provide means for locking handle in the ON position where indicated.

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. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Identify enclosed switches in accordance with Section 26 0553.

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3.02 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

**SECTION 26 5100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Ballasts and drivers.
- D. LED emergency power supply units.
- E. Accessories.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0533.13 - Conduit for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0533.16 - Boxes for Electrical Systems.
- G. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 26 0935 - Distributed Digital Lighting Control System: Devices for automatic control of lighting, including occupancy sensors, daylighting controls, networked control stations and motion sensors.
- I. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.
- J. Section 26 5600 - Exterior Lighting.

1.03 REFERENCE STANDARDS

- A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 1989 (Corrigendum 2019).
- B. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- C. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- D. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- E. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.
- H. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- I. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2020.
- J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012 (Reaffirmed 2018).
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

- M. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- N. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- O. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.
- P. 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.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. 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.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70 and NFPA 101.

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 and NFPA 101.
- 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), light engines, drivers 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.
- 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.

2.03 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.

2.04 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 - 3. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to 10 percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
- C. Dimmable LED Drivers: Comply with Section 26 0935 - Distributed Digital Lighting Control System.

2.05 LED EMERGENCY POWER SUPPLY UNITS

- A. Manufacturers:
 - 1. Iota Engineering, LLC: www.iotaengineering.com
 - 2. Lithonia Lighting: www.lithonia.com
 - 3. Philips Emergency Lighting/Bodine: www.bodine.com
 - 4. Manufacturer Limitations: Where possible, for each type of luminaire provide emergency power supply units produced by a single manufacturer.
 - 5. Where a specific manufacturer or model is indicated elsewhere in the luminaire schedule or on the drawings, substitutions are not permitted unless explicitly indicated.
- B. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

- C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- D. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.
- E. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.
- F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status and field selectable audible alert.

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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.
- B. Verify that suitable support frames are installed where required.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- D. 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 securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- 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. 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.
- G. Suspended Luminaires:
 - 1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 2. Install canopies tight to mounting surface.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. 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.
- L. Exit Signs:

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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.
- M. LED Emergency Power Supply Units:
1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
- N. Identify luminaires connected to emergency power system in accordance with Section 26 0553.
- O. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and emergency power supply units to verify proper operation upon loss of normal power supply.

**SECTION 26 5600
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts and Drivers.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Section 26 0005 - Basic Electrical Requirements.
- D. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- E. Section 26 0529 - Hangers and Supports for Electrical Systems.
- F. Section 26 0533.16 - Boxes for Electrical Systems.
- G. Section 26 0935 - Distributed Digital Lighting Control System: Automatic controls for lighting including outdoormotion sensors and outdoor photo controls.
- H. Section 26 2726 - Wiring Devices: Receptacles for installation in poles.
- I. Section 26 5100 - Interior Lighting.

1.03 REFERENCE STANDARDS

- A. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2017.
- B. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 1989 (Corrigendum 2019).
- C. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
- D. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.
- E. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.
- F. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.
- G. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities; 2021.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- I. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).
- J. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2020.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

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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.

1.05 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

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.
- 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.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise 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. Exposed Hardware: Stainless steel.

2.03 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
 3. All remote drivers shall be installed such that they are concealed from plain view. Drivers shall installed in building interior or other conditioned space in an accessible location per NEC requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. 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.
- B. Verify that suitable support frames are installed where required.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 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 in accordance with NECA/IESNA 501.
- 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. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.

**SECTION 28 4600
FIRE DETECTION AND ALARM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. 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

- A. Division 01 - General Requirements: Project administrative and procedural requirements.
- B. Division 02 - Existing Conditions: Demolition, cleaning and disposal requirements, cutting and patching requirements, and repairs.
- C. Division 07 - Thermal and Moisture Protection: Materials and methods for work to be performed by this installer.
- D. Division 08 - Openings: Door hardware, coiling fire doors and smoke and/or fire curtains to be released by fire alarm system.
- E. Section 23 3300 - Air Duct Accessories: Smoke dampers and Smoke detectors monitored and controlled by fire alarm system.
- F. Section 26 0005 - Basic Electrical Requirements.
- G. Section 26 0505 - Selective Demolition for Electrical
- H. Section 26 0533.13 - Conduit for Electrical Systems.
- I. Section 26 0533.16 - Boxes for Electrical Systems.
- J. Section 26 0553 - Identification for Electrical Systems.

1.03 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 - 2010 ADA Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; Most Recent Edition Cited by Referring Code or Reference Standard.
- F. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Contractor shall provide submittals for equipment listed herein. Refer to Division 01 for submittal procedures.
- B. Evidence of designer qualifications.

- C. 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.
- D. Evidence of installer qualifications.
- E. Evidence of instructor qualifications; training lesson plan outline.
- 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.
- H. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 - 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 - 4. List of recommended spare parts, tools, and instruments for testing.
 - 5. Replacement parts list with current prices, and source of supply.
 - 6. Detailed troubleshooting guide and large scale input/output matrix.
 - 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 - 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- I. Project Record Documents: 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:

Kingscott Associate, Inc.
Architects/Engineers
Kalamazoo, Michigan

Lansing School District
Newcomer Center Remodeling
Lansing, Michigan

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.

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.
- D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories:
 1. Honeywell Security & Fire Solutions/Notifier: www.notifier.com.
 2. National Time & Signal: www.natsco.net.
 3. Siemens Building Technologies, Inc: www.usa.siemens.com.
 4. Simplex, a brand of Johnson Controls: www.simplex-fire.com.
 5. Edwards Fire Safety, a brand of Carrier: www.edwardsfiresafety.com.
 6. Provide control units made by the same manufacturer.
- B. 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.

2.02 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 2. Protected Premises: Entire building shown on drawings.
 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction.
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. 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: Single smoke zone; general evacuation of entire premises.

5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
 6. Program notification zones and voice messages as directed by Owner.
 7. Fire Alarm Control Unit: New, located at front entrance.
- B. Supervising Stations and Fire Department Connections:
1. Public Fire Department Notification: By remote supervising station.
 2. Remote Supervising Station: UL-listed central station under contract to facility.
 3. Means of Transmission to Remote Supervising Station: Digital alarm communicator transmitter (DACT), 2 telephone lines.
- 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. Spare Capacity:
1. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. 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 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72.
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
1. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
 2. Duct smoke detectors.
 3. Area smoke detectors.
- C. Lighting Control
1. Connection between fire alarm systems and lighting control systems.
 - a. Upon activation of fire alarm system, lighting control system shall provide full illumination to all emergency fixtures along path of egress for 90 minutes, or until alarm is reset.
- D. HVAC:
1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.
 2. Control Modules: Shut down air handlers indicated.
- E. Sound and Entertainment Systems:
1. Turn off Sound and Entertainment Systems upon activation from Fire Alarm controller.
- F. Doors:
1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 08 7100.
 2. Electromagnetic Door Locks on Egress Doors: Unlock upon activation of any alarm initiating device or suppression system in smoke zone that doors serve as egress from. Refer to Division 08.

2.04 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 in Basis of Design.
- D. Remote Annunciators: locate per plans.
- E. 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.
 - c. Connect all dwelling unit initiating devices back to Fire Alarm Control Panel. Provide supervisory signal to Supervising Station.
 - 2. Manual Pull Stations: _____.
 - 3. Smoke Detectors: _____.
 - 4. Duct Smoke Detectors: _____.
- F. Notification Appliances:
- G. Circuit Conductors: Copper; provide 200 feet extra; color code and label.
- H. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- I. Locks and Keys: Deliver keys to Owner.
- J. 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 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- 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 OWNER PERSONNEL INSTRUCTION

- A. Provide the following instruction to designated Owner personnel:
 - 1. Hands-On Instruction: On-site, using operational system.
 - 2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
- B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
 - 1. Initial Training: 1 session pre-closeout.
- C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
 - 1. Initial Training: 1 session pre-closeout.
- D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.04 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.

3.05 MAINTENANCE

- A. See Division 01 for additional requirements relating to maintenance service.
- B. 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.
- C. 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.
- D. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- E. 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.
- F. Comply with Owner's requirements for access to facility and security.

2024 DISTRICT PROJECTS

NEWCOMER CENTER REMODELING

LANSING SCHOOL DISTRICT

LANSING, MICHIGAN

CONSTRUCTION DOCUMENTS
MARCH 22 2024

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910

DIRECTORY

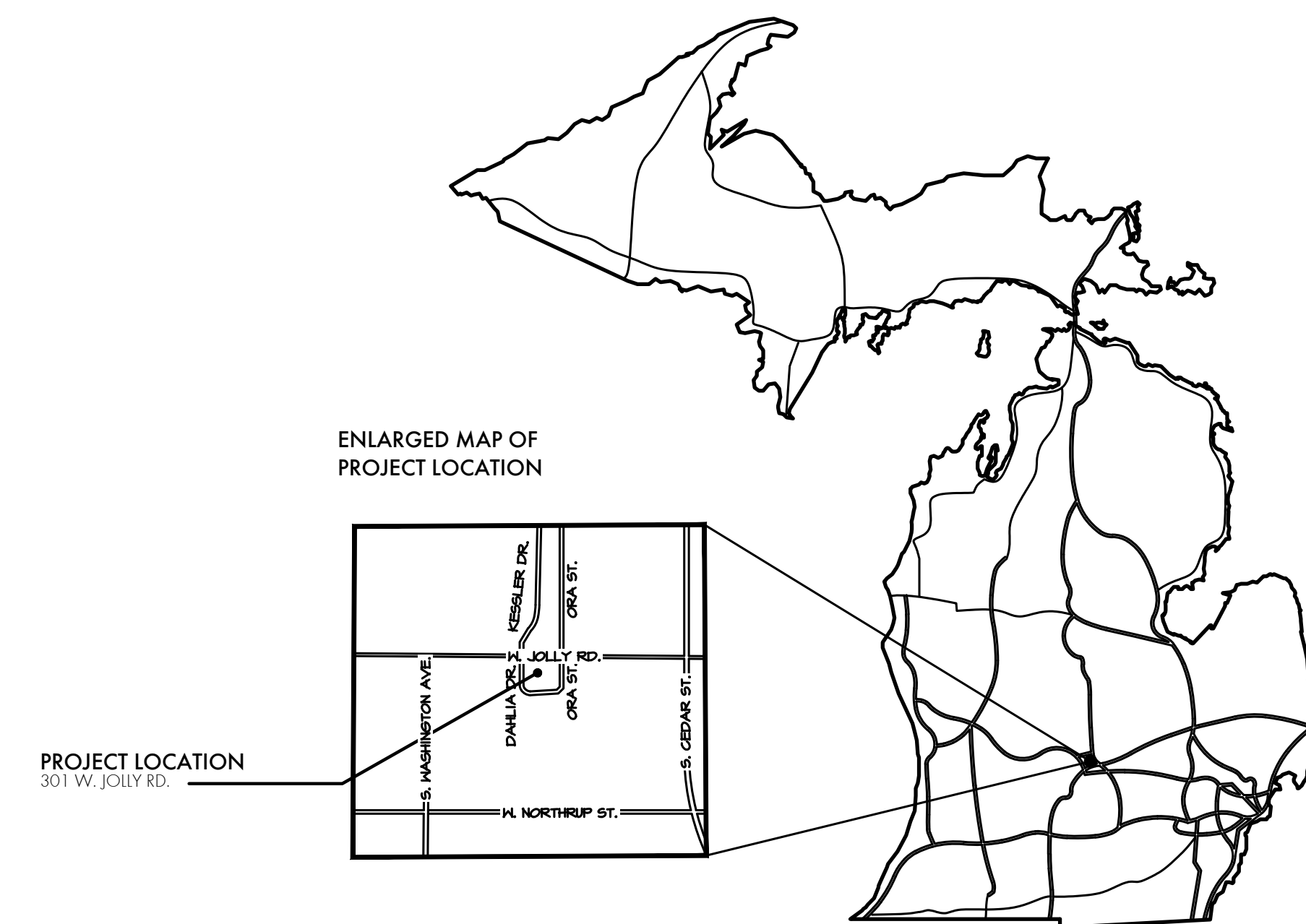
OWNER
Lansing School District
519 West Kalamazoo St.
Lansing, MI 48933
P. 517 - 755 - 1000

ARCHITECT & ENGINEER
Kingscott
259 East Michigan Ave, Suite 308
Kalamazoo, MI 49007
P. 269 - 381 - 4880

CONSTRUCTION MANAGER
Laux Construction
1018 Hogsback Rd
Mason, MI 48854
P. 517 - 694 - 0117

M/E CONSULTANT
Strategic Energy Solutions
4000 West Eleven Mile Rd.
Berkley, MI 48072
P. 248 - 399 - 1900

SITE MAP



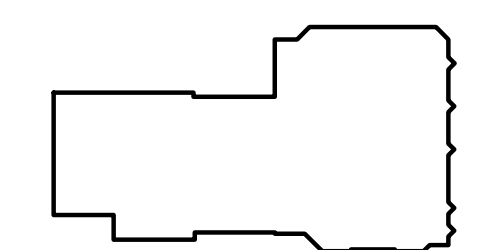
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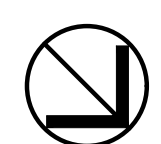
G1	COVER SHEET
G2	DATA SHEET & MOUNTING HEIGHTS
LS 0.1	LIFE SAFETY PLAN AND CODE COMPLIANCE SUMMARY
ARCHITECTURAL	
D1.1	DEMOLITION FLOOR & REFLECTED CEILING PLANS
A1.1	FLOOR PLAN, ENLARGED PLANS & DETAILS
A6.1	DOOR SCHEDULE
A6.2	DOOR & WINDOW DETAILS
A8.1	COLOR FINISH & EQUIPMENT PLANS
MECHANICAL	
M0.0	MECHANICAL GENERAL INFORMATION
MD1.1	FIRST FLOOR MECHANICAL DEMOLITION PLAN
M1.1	FIRST FLOOR MECHANICAL PLAN
M5.0	MECHANICAL DETAILS & SCHEDULES
M8.0	MECHANICAL CONTROLS
PLUMBING	
PD1.1	FIRST FLOOR PLUMBING DEMOLITION PLAN
P1.1	FIRST FLOOR PLUMBING PLAN
P5.0	PLUMBING DETAILS & SCHEDULES
ELECTRICAL	
E0.0	ELECTRICAL GENERAL INFORMATION
ED1.1	FIRST FLOOR POWER DEMOLITION PLAN
ED2.1	FIRST FLOOR LIGHTING DEMOLITION PLAN
EP1.1	FIRST FLOOR POWER PLAN
EL1.1	FIRST FLOOR LIGHTING PLAN
E6.0	ELECTRICAL SCHEDULES & RISER DIAGRAM



REVISIONS/REVIEW	DATE
CONSTRUCTION DOCUMENTS	03.22.2024

KEY PLAN



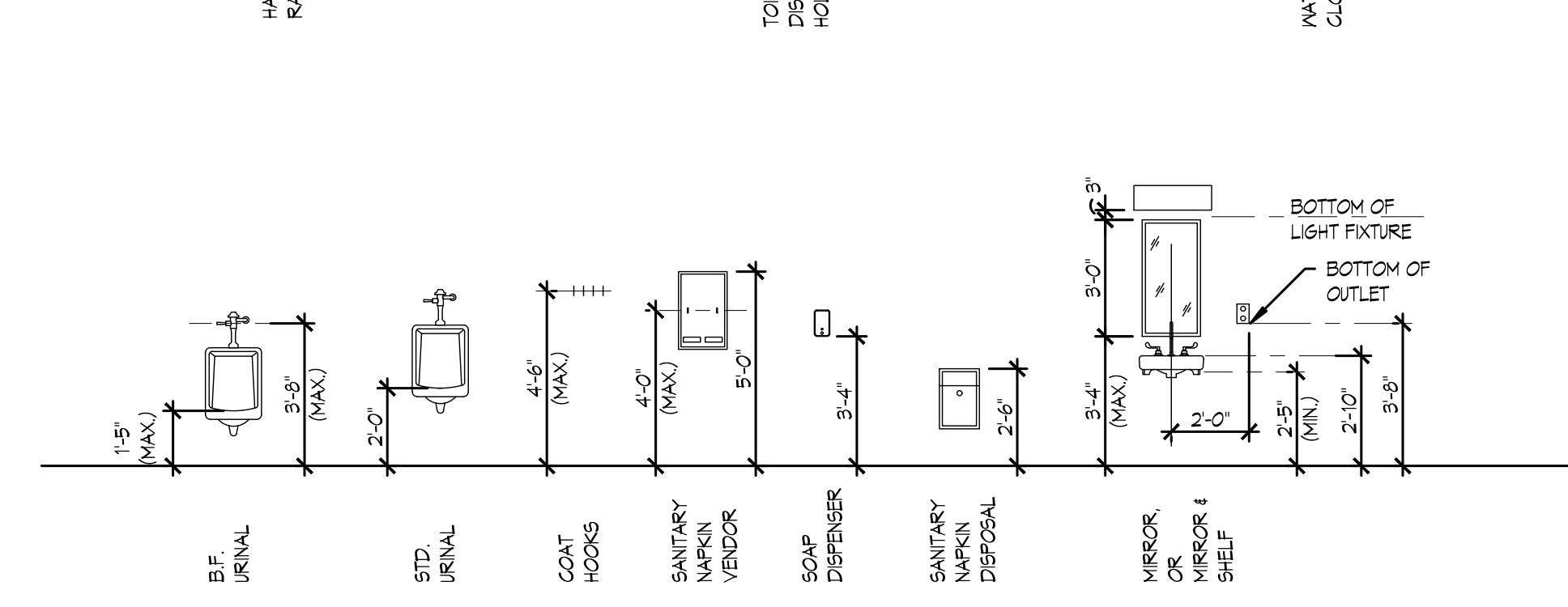
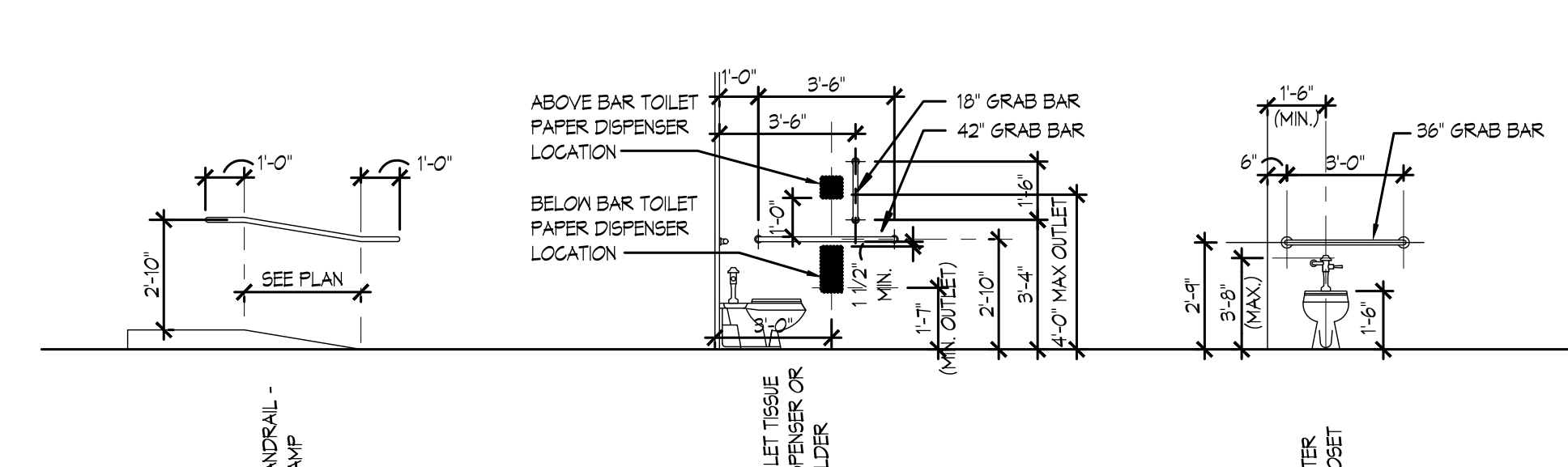
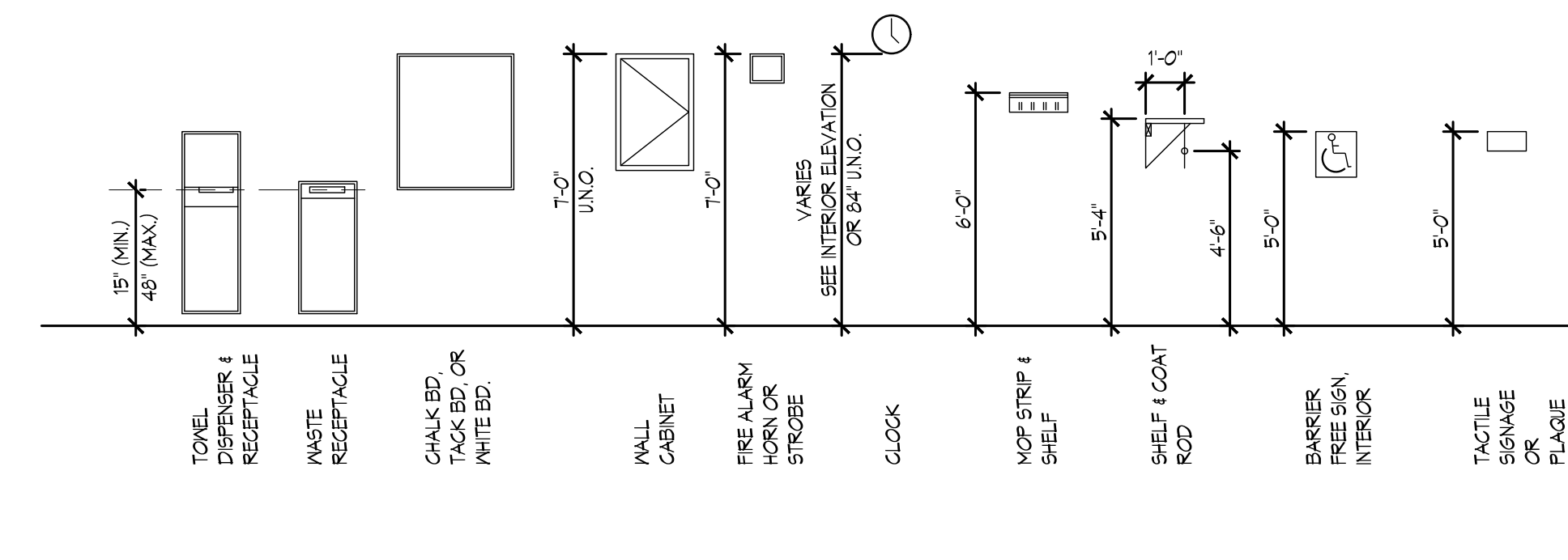
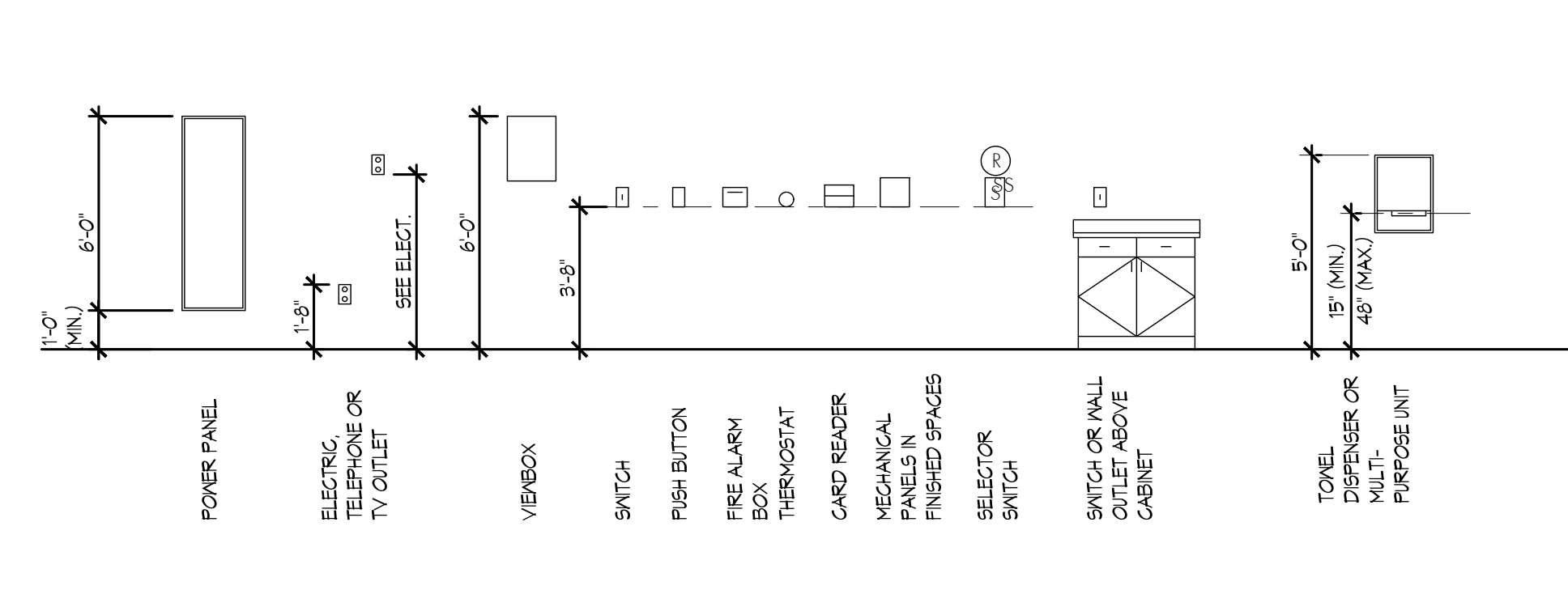
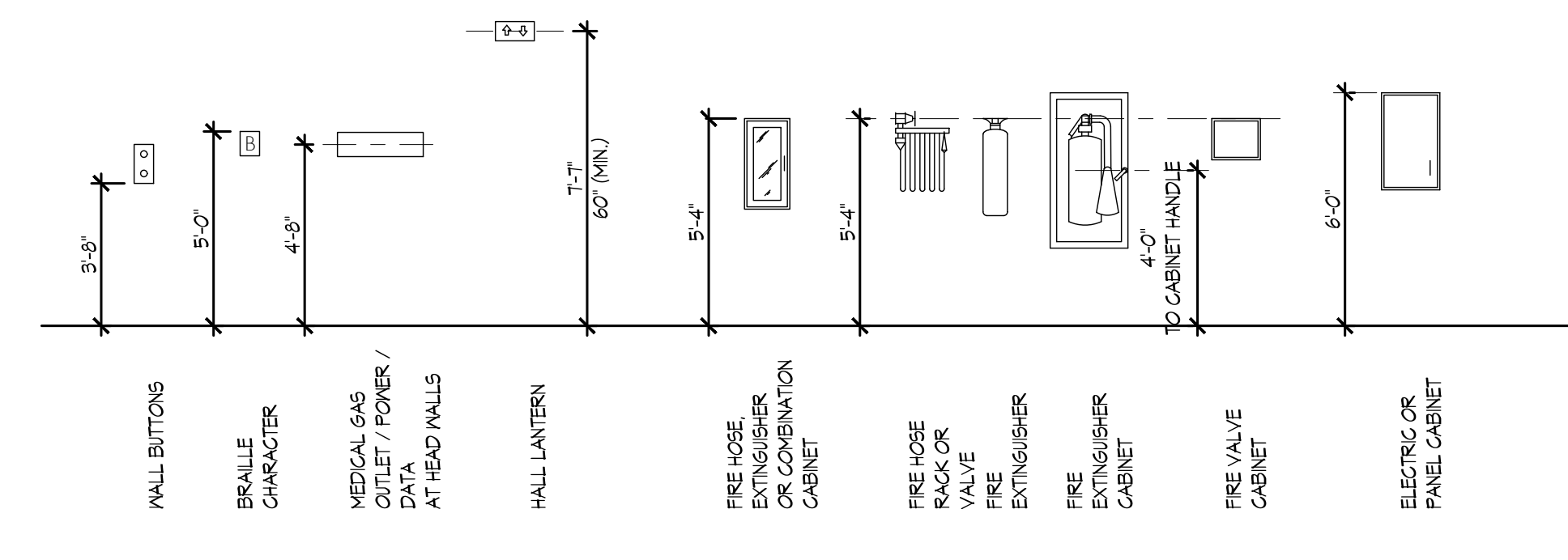
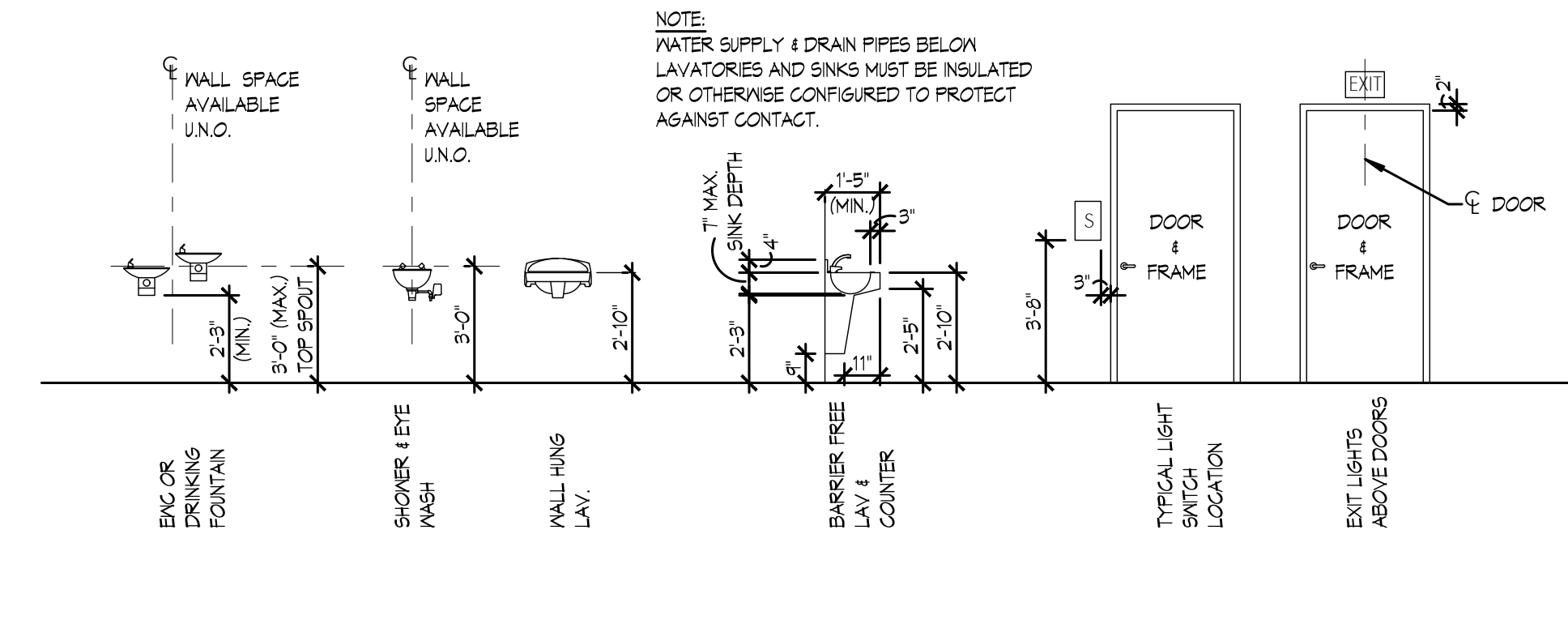
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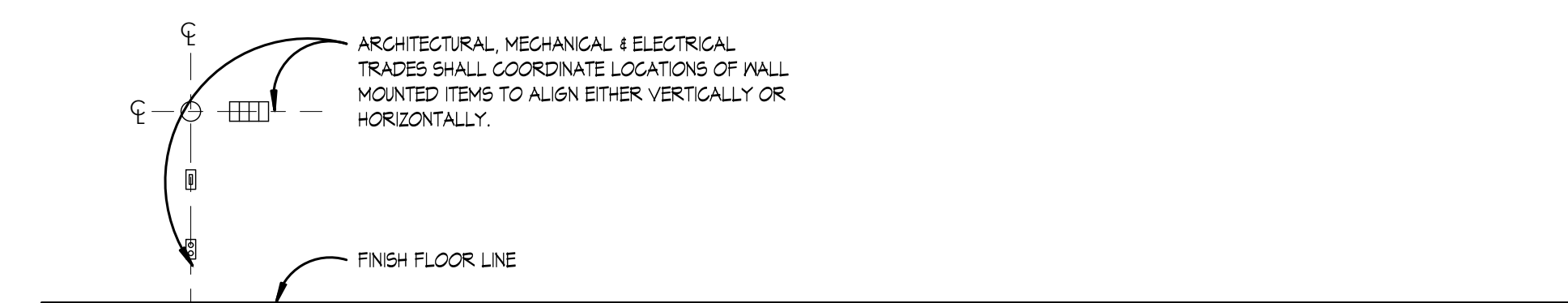
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G1

MOUNTING HEIGHTS (U.N.O.)



MOUNTING HEIGHT COORDINATION



ABBREVIATIONS

ADJ	ADJACENT	F.S.	FULL SIZE	PT	POINT
AFF	ABOVE FINISHED FLOOR	FT	FEET	PVC	POLYVINYL-CHLORIDE
AL / ALUM	ALUMINUM	FTG	FOOTING	R / RAD	RADIUS
ALT	ALTERNATE	FURN	FURNITURE	RAF	RESILIENT ATHLETIC FLOOR
APC	ACOUSTICAL PANEL CEILING	FURP	FIBERGLASS REINFORCED PANEL	RB	RESILIENT BASE / RUBBER BASE
APPROX	APPROXIMATE	GAL	GALLON	RD	ROOF DRAIN
ARCH	ARCHITECT / ARCHITECTURAL	GALV	GALVANIZED	REC	RECESSED
AVG	AVERAGE	GB	GRAB BAR	RECT	RECTANGLE / RECTANGULAR
ANP	ACOUSTICAL WALL PANEL	GC	GENERAL CONTRACTOR	REF	REFERENCE
BD	BOARD	GEN	GENERAL	REIN	REINFORCED / REINFORCEMENT
BF	BELOW FINISHED FLOOR	GOVT	GOVERNMENT	RESIL	RESILIENT
BFFST	BARRIER FREE STONE THRESHOLD	GYP	GYPSON	REQD	REQUIRED
BL	BORROWED LIGHT	HD	HAND	REV	REVISION
BLDG	BUILDING	HDWR	HARDWARE	RF6	ROOFING
BLK	BLOCK	HDWD	HARDWOOD	RFS	RUBBER FLOOR SHEET
BM	BEAM	HM	HOLLOW METAL	RFT	RUBBER FLOOR TILE
BN	BULLNOSE	HORZ	HORIZONTAL	RGH	ROUGH
B.O.	BY OWNER	HP	HIGH POINT	RM	ROOM
BOD	BOTTOM OF DECK	HPC	HIGH PERFORMANCE COATING SYSTEM	RO	ROUGH OPENING
BOX	BOTTOM OF STEEL	HR	HOUR	RSTA	RESILIENT STAIR TREAD ACCESSORY
BOT	BOTTOM	HT	HEIGHT	RT	RESILIENT TRANSITION
BOX	BOTTOM OF STEEL	ID	INSIDE DIAMETER	S	SOUTH
BOT	BOTTOM	IN	INCH	SAF	SAFETY
BOT	BOTTOM	INCL	INCLUDE	SC	SEALED CONCRETE
BPG	BEARING PLATE	INFO	INFORMATION	SCH	SCHEDULE
BSG	BEARING	INSUL	INSULATION	SECT	SECTION
BSMT	BASEMENT	INT	INTERIORS	SECY	SECRETARY
		JAN	JANITOR	SEQ	SEQUENCE
		JG	JANITOR CLOSET	SHT	SHEET
		JCT	JUNCTION	SIM	SIMILAR
		JT	JOINT	SPEC	SPECIFICATIONS
		KIT	KITCHEN	SPPRF	SCAFFOLD
		KP	KICK PLATE	SPM	SINGLE FLY MEMBRANE
		KS	KNEE SPACE	SQ	SQUARE
		L	LENGTH	SS	STAINLESS STEEL
		LAB	LABORATORY	STA	STATION
		LB	POUND	STD	STANDARD
		LN	LINEAR	STL	STEEL
		LKR	LOCKER	STOR	STOR STORAGE
		LH	LONG LEG HORIZONTAL	STR	STRUCTURAL
		LJ	LONG LEG VERTICAL	SUB	SUB FLOOR
		LLV	LONG LEG VERTICAL	SUBP	SUBPENDED
		LONG	LONGITUDINAL	SYM	SYMMETRICAL
		LP	LOW POINT	STOR	STORAGE
		LVT	LUXURY VINYL TILE	SV	SHEET VINYL FLOORING
		MAT/MATL	MATERIAL	T	TOILET
		MAX	MAXIMUM	T&G	TONGUE & GROOVE
		MB	MARKERBOARD	TA	TOILET ACCESSORY
		MFR	MANUFACTURER	TB	TACK BOARD
		MIN	MINIMUM	TC	TOP CHORD
		MISC	MISCELLANEOUS	TCX	TOP CHORD EXTENSION
		MS	MASONRY OPENINGS	TEL	TELEPHONE
		MS	METAL SHELVING	TEMP	TEMPERATURE
		MTD	MOUNTED	THK	THICK
		MTL	METAL	TB	TOP OF BEAM
		MT	METAL TRANSITION	TOP	TOP OF FOOTING
		MXL	METAL WARDROBE LOCKER	TOJ	TOP OF JOIST
		N	NORTH	TOL	TOP OF LEDGE
		NC	NOT IN CONTRACT	TOM	TOP OF MASONRY
		NO	NUMBER	TOS	TOP OF STEEL
		NTS	NOT TO SCALE	TOP	TOP OF WALL
		OD	OUTSIDE DIAMETER	TS	TUBE STEEL
		OFD	OVERFLOW DRAIN	TV	TELEVISION
		OFF	OFFICE	TYP	TYPICAL
		OH	OVERHEAD	TZ	TERRAZZO
		OP	OPERABLE PARTITION	TZT	TERRAZZO TILE
		OPNG	OPENING	UNFN	UNFINISHED
		OPP	OPPOSITE	UNO	UNLESS NOTED OTHERWISE
		P / PTPANT		VBS	VOLLEYBALL STANDARD
		PART	PARTITION	VCT	VINYL COMPOSITION TILE
		PC	POLISHED CONCRETE	VDB	VISUAL DISPLAY BOARD
		PERF	PERFORATED	VERT	VERTICAL
		PL	PLATE	VEST	VESTIBULE
		PLAM	PLASTIC LAMINATE	VIF	VERIFY IN FIELD
		PLAT	PLATFORM	VIN	VINYL
		PLND	PLYWOOD	VOL	VOLUME
		POL	POLISH	VRB	VENTER RUBBER BASE
		P.P.M.	PARTS PER MILLION	W	WEST
		PR	PART	W/	WITH
		PREFAB	PREFABRICATED	WAF	WID ATHLETIC FLOOR
		PREFIN	PREFINISHED	WB	WOOD BASE
		PROJ	PROJECT	WC	WALL COVERING
		PSE	PROJECTION SCREEN - ELECTRIC	WD	WOOD
		PSM	PROJECTION SCREEN - MANUAL	W/O	WITHOUT
		PSF	POUNDS PER SQUARE FOOT	W.P.	WORKING POINT
		PSI	POUNDS PER SQUARE INCH	WPF	WATERPROOF
				WT	WEIGHT
				YD	YARD

ARCHITECTURAL & INTERIOR SYMBOLS

XXX	ROOM NUMBER	xx	WALL SECTION	=====	EXISTING CONSTRUCTION
(XXX)	DOOR/BORROWED LITE	XXXX	INTERIOR ELEVATION	=====	NEW CONSTRUCTION
X	WINDOW/STOREFRONT/INSULATED PANEL NUMBER	XXXX	EXTERIOR ELEVATION	∠	ANGLE
+	DEMOLITION DRECTIVE TAG	XXXX	PLAN/SECTION DETAIL	ε	CENTERLINE
▲	ELEVATION	OR/BSO	KEYNOTE DESIGNATION		
XX	BUILDING SECTION	CS	SECTION REFERENCE		

MATERIAL SYMBOLS

PLAN & SECTION INDICATIONS					
EARTH	BRICK	RIGID INSULATION			
CONCRETE	CMU	SPRAY FOAM INSULATION			
PLYWOOD	ACOUSTICAL TILE				
WOOD FINISHED	GYPSON BOARD				
WOOD ROUGH	BATT INSULATION				

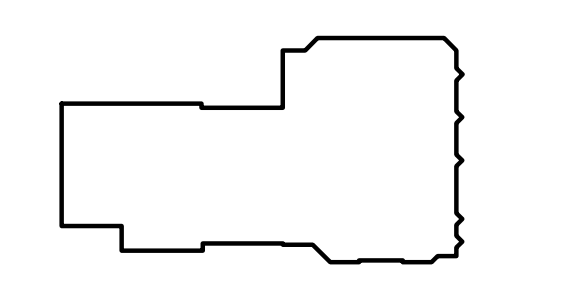


LANSING SCHOOL DISTRICT
 2024 District Projects
 NEWCOMER CENTER REMODELING
 301 WEST JOLLY ROAD, LANSING, MI 48910



REVISIONS/REVIEW	DATE
CONSTRUCTION DOCUMENTS	03.22.2024

KEY PLAN



BUILDING AREA - MICHIGAN BUILDING CODE:

OCCUPANCY: E, EDUCATIONAL
 CONSTRUCTION TYPE: V B (EXISTING) (MBC T601; NFPA 220)
 FIRE SPRINKLER SYSTEM: NOT SPRINKLERED

BUILDING CODE INFORMATION:

RULES AND CODES: MICHIGAN BUILDING CODE 2015
 2012 NFPA 101 LIFE SAFETY CODE
 BARRIER FREE DESIGN: MICHIGAN BUILDING CODE 2015 CHAPTER II
 PLUMBING CODE: MICHIGAN PLUMBING CODE 2018
 MECHANICAL CODE: MICHIGAN MECHANICAL CODE 2015
 ELECTRICAL CODE: NATIONAL ELECTRICAL CODE 2017
 REHABILITATION CODE: MRCEB 2015

ALLOWABLE HEIGHT/AREA:

ALLOWABLE HEIGHT: 40'-0" (MBC T-504.3)
 ALLOWABLE STORIES: 1 STORIES (MBC T-504.4)
 ALLOWABLE AREA: 9500 SF. (MBC T-506.2)
 (1) FLR + NOT SPRINKLERED
 TOTAL FLOOR AREA = 7115 SF.

MEANS OF EGRESS REQUIREMENTS:

ALLOWED
 COMMON PATH OF TRAVEL: 75'-0" (MBC T1006.2); LSC 14.2.3.2
 EXIT TRAVEL DIST.: 150'-0" (MBC T1011.2; LSC 14.2.6.2)
 DEAD ENDS: 20'-0" NOT SPRINKLED (MBC 1020.4; LSC 14.2.5.2)
 CORRIDOR FIRE RATING: 1 HR NOT SPRINKLED (MBC T1020.1)
 MINIMUM CORRIDOR WIDTH: 6'-0" (MBC 1020.2; LSC 14.2.3.2)

CODE COMPLIANCE LEGEND:

- (1) HOUR FIRE RATED WALL CONSTRUCTION FOR EXIT ENCLOSURES (LSC 7.1.3.2.1); MBC 1004.2.1, 1020.1, 1022.2, 1015)
 - OPENINGS ARE LIMITED (LSC 7.1.3.2.1(4); MBC 1022.2, 716)
 - PENETRATIONS ARE LIMITED (LSC 7.1.3.2.1(10); MBC 1020.5, 1020.5.1, 717.5.2)
 - EXPOSURES (LSC 7.2.2.5.2)
 - SUPPORTING CONSTRUCTION (LSC 8.2.3.3; MBC 707.5.1)
- (1) HOUR FIRE RATED WALL CONSTRUCTION FOR PROTECTION FROM HAZARDS / INCIDENTAL ACCESSORY OCCUPANCY (LSC 14.3.2.1(1); MBC 504.4.1; 707.3.7)
- FE FEG FIRE EXTINGUISHER / FIRE EXTINGUISHER CABINET
 SEE FLOOR PLANS FOR LOCATIONS
 FE (SEMI RECESSED) - AT SPECIAL HAZARDS (MBC 906.1)
 - 75' MAX. TRAVEL DISTANCE TO EXTINGUISHER (NFPA 10.6.2.1.1)
 - 3000 SF MAX.FLOOR AREA PER EACH 2-A EXTINGUISHER (NFPA 10. 6.2.1.1)

- EXIT EXIT
- X CALCULATED OCCUPANT LOAD OF ROOM OR CUMULATIVE OCCUPANT LOAD AT EGRESS COMPONENT (LSC 7.3.1.2; MBC T1004.1.2) AND RELATIVE SQUARE FOOTAGE OF SPACE.
- X CAPACITY OF EGRESS COMPONENT PER LSC 7.3.3.1 AND MBC SECT. 1005.3.1 & 1005.3.2
- E RESCUE/EGRESS WINDOW
- XXX EXISTING DOOR
- XXX NEW DOOR
- LINE OF EGRESS TRAVEL

ROOM USE LEGEND:

CLRM	CLASSROOM	OFF	OFFICE
CONF	CONFERENCE ROOM	FURN	FURNACE/MECHANICAL
CORR	CORRIDOR	TLT	TOILET ROOM
ELEC	ELECTRICAL	CL	CLOSET
JC	JANITOR CLOSET	VEST	VESTIBULE
P	PANTRY	LKR	LOCKER
ST.	STORAGE		

OCCUPANT LOAD (LSC 7.3.1.2 / MBC 1004.1.2)

ASSEMBLY USE:
 CONCENTRATED USE W/O FIXED SEATING: 1/75 SF NET
 LESS CONCENTRATED W/O FIXED SEATING: 1/150 SF NET

EDUCATIONAL USE:
 CLASSROOM: 1/20 SF NET
 SHOPS, LABS, VOCATIONAL: 1/50 SF NET

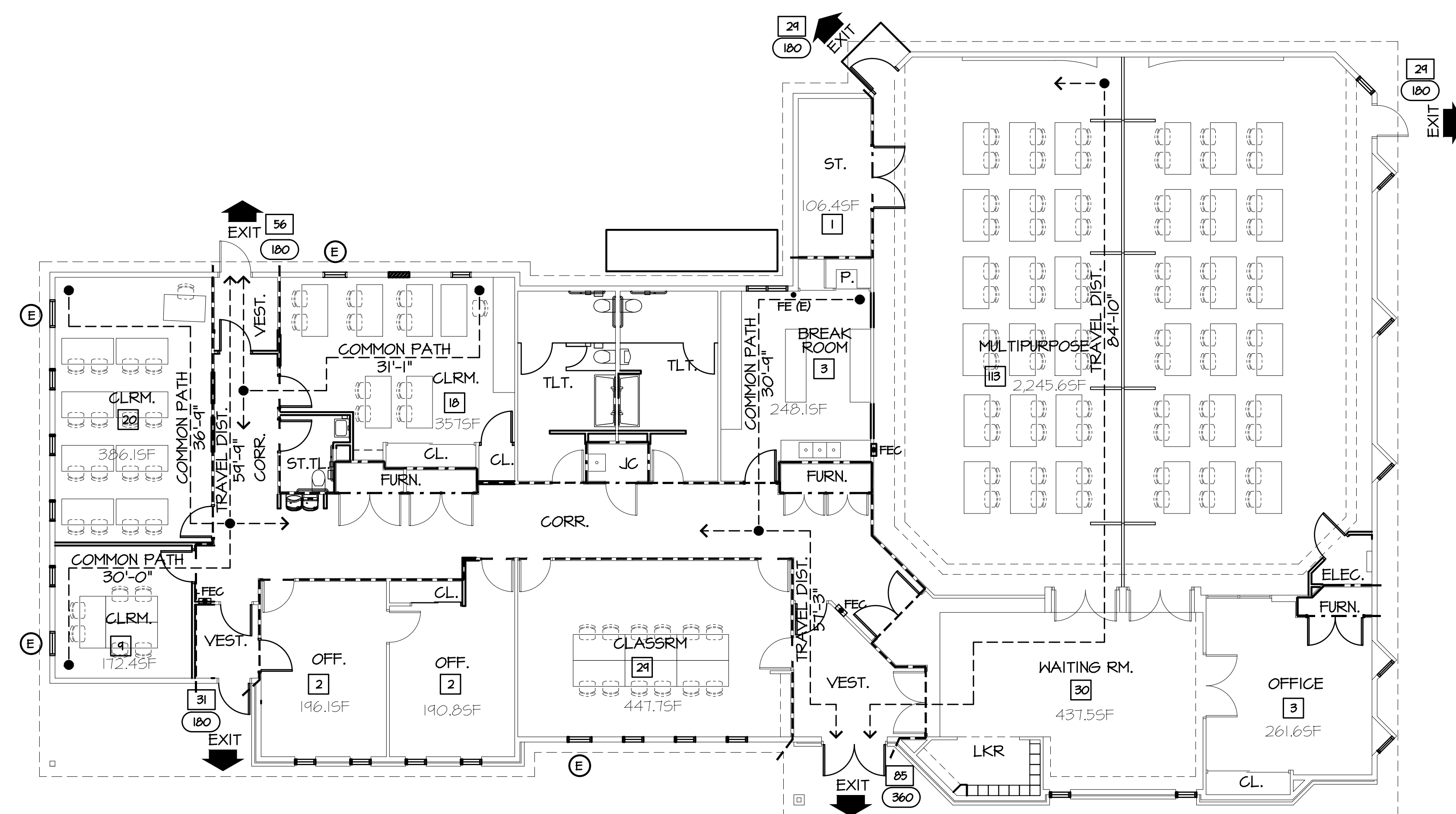
CONFERENCE ROOM: 1/15 SF NET
 COMMON AREAS: 1/15 SF NET
 KITCHEN: 1/100 SF
 BUSINESS USE: 1/100 SF
 STORAGE: 1/300 SF
 MECHANICAL: 1/300 SF

MIN NUMBER OF PLUMB. FIXTURES (MBC 2018 TABLE 2902.1)

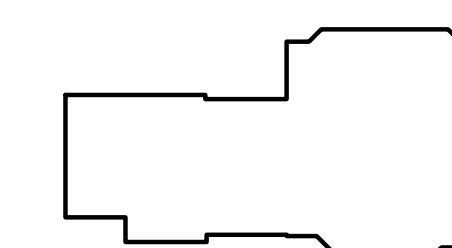
EDUCATIONAL: WC 1/50
 LAVATORIES 1/50
 DP 1/100
 S. SINK 1

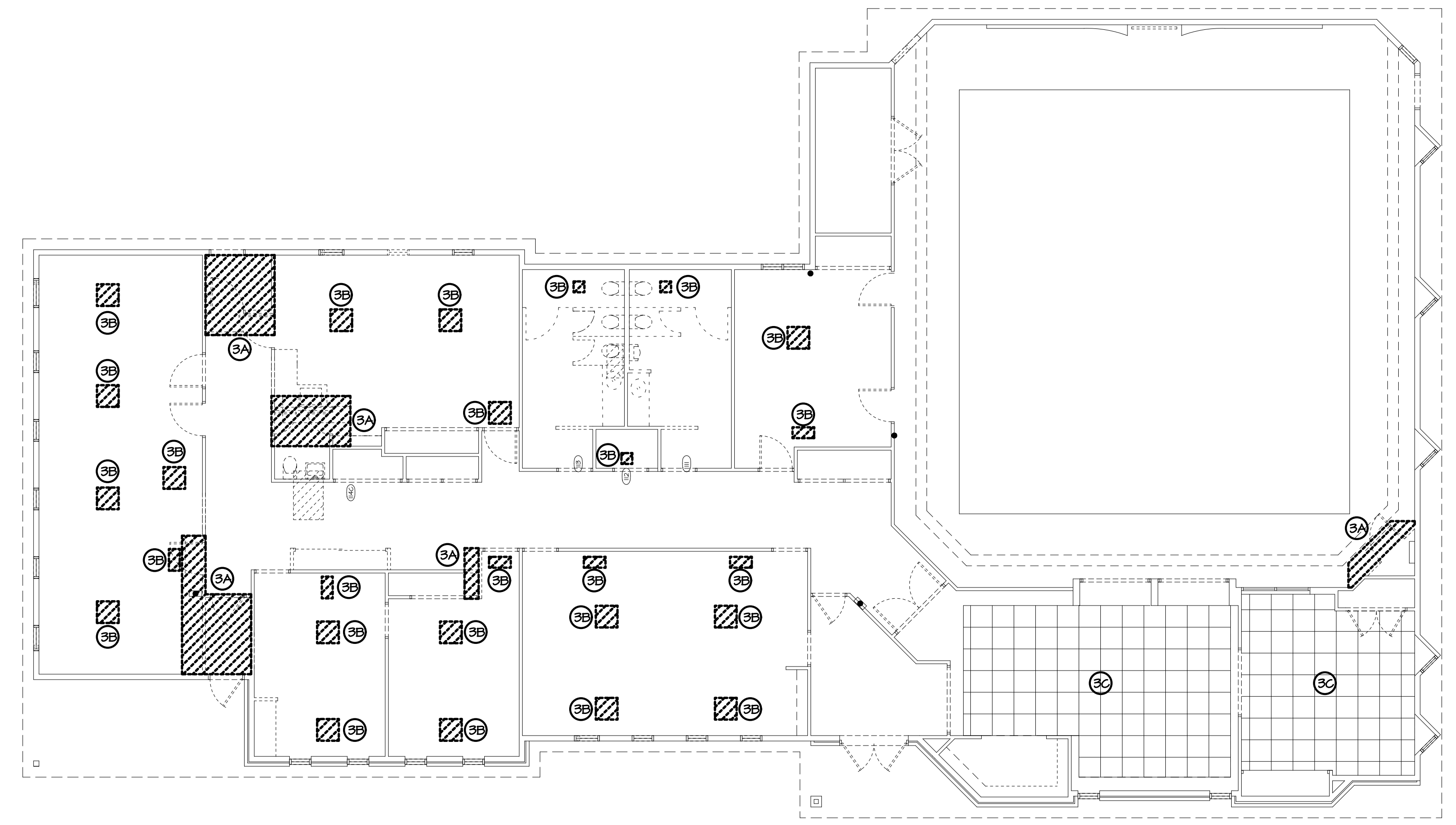
GENERAL NOTES:

- ALL CORRIDOR WALLS SHALL TERMINATE AT THE UNDERSIDE OF THE RATED GYPSUM BOARD ASSEMBLY ATTACHED TO BOTTOM OF ROOF TRUSSES.
- SEAL ALL PENETRATIONS AND OPENINGS IN FIRE RATED WALL CONSTRUCTION WITH FIRE RESISTANT RATED SEALANT AND/OR FIRESTOPPING TO MATCH WALL RATING AS INDICATED.
- EGRESS/RESCUE WINDOWS ARE REQUIRED IN BUILDING (LSC 14.2.11.1)

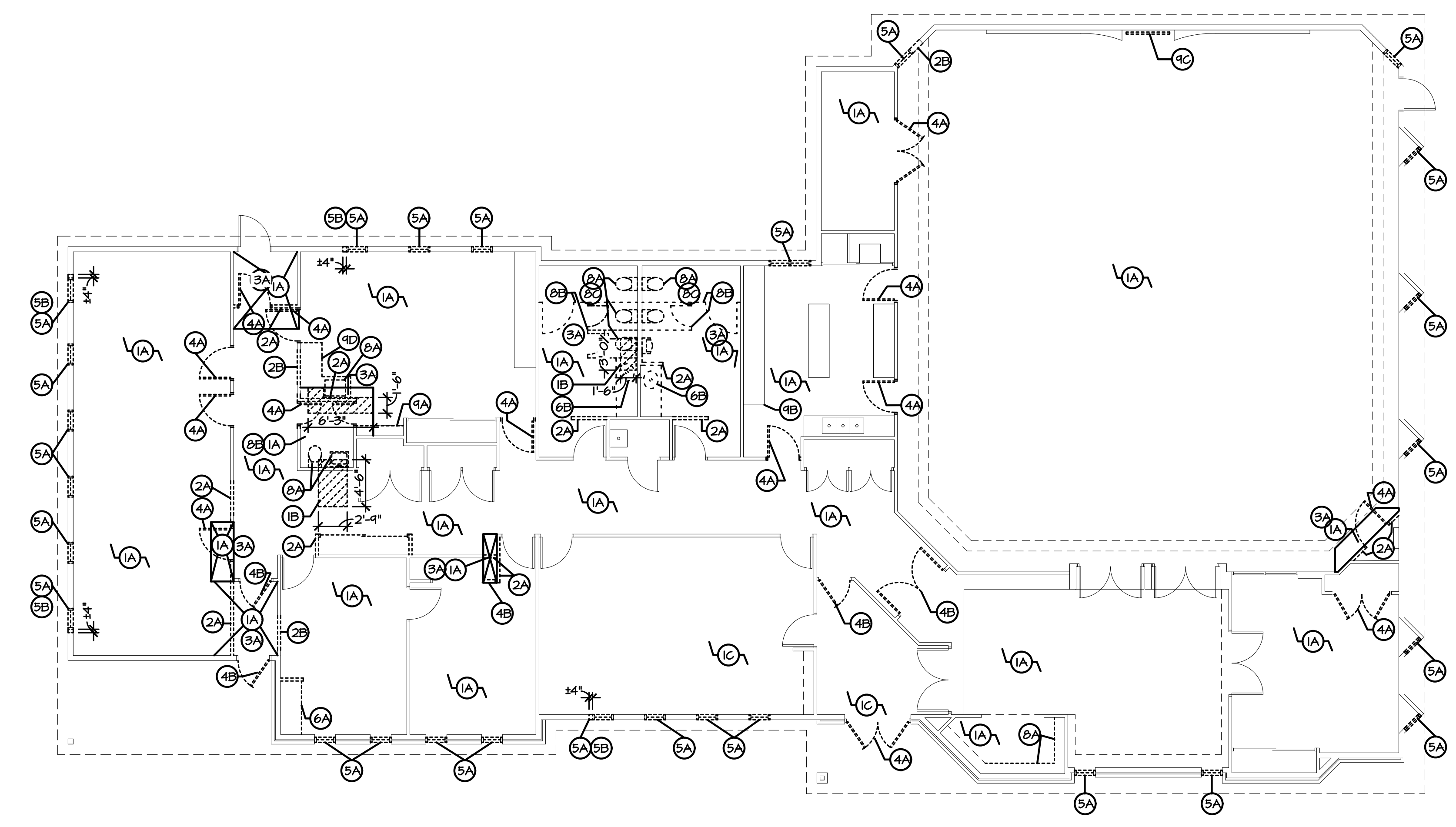


1 CODE COMPLIANCE PLAN
 SCALE: 1/8" = 1'-0"





2 REFLECTED CEILING DEMOLITION PLAN
SCALE: 1/8" = 1'-0"



1 DEMOLITION PLAN
SCALE: 1/8" = 1'-0"

GENERAL ARCHITECTURAL DEMOLITION NOTES:

1. THE DEMOLITION PLANS GENERALLY INDICATE AREAS OF EXTENSIVE REMOVALS AND DO NOT INDICATE ALL OF THE WORK. CONTRACTOR SHALL PERFORM ALL THE DEMOLITION WHICH IS NECESSARY FOR THE PROPER EXECUTION OF THE PROJECT, WHETHER OR NOT SAID DEMOLITION IS SPECIFICALLY INDICATED WITHIN THE DOCUMENTS.
2. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH ALL OTHER DRAWINGS AND SPECIFICATIONS FOR OTHER AREAS THAT WILL REQUIRE DEMOLITION NOT INDICATED ON THESE SHEETS.
3. CONTRACTOR IS RESPONSIBLE TO INFILL, PATCH AND/OR REPAIR EXISTING WALLS, FLOORS AND CEILING TO MATCH EXISTING WHERE DEMOLITION OCCURS OTHER THAN AS DESCRIBED IN THESE DOCUMENTS.
4. PATCH AND REPAIR REMAINING ADJACENT SURFACES AT AREAS OF REMOVAL AND/OR ALTERATION TO MATCH EXISTING. PROVIDE A SOUND AND PROPER SUBSTRATE FOR NEW FINISH. COORDINATE WITH COLOR PLANS, WHERE A NEW FINISH IS NOT INDICATED, MATCH EXISTING ADJACENT FINISHES.
5. ALL DEMOLITION IS TO BE DONE WITH REASONABLE CARE AS TO MINIMIZE DAMAGE TO EXISTING REMAINING SURFACES. CONTRACTOR IS RESPONSIBLE TO PROPERLY DISPOSE OF ALL DEMOLISHED ITEMS NOT INDICATED TO BE RELOCATED OR TURNED OVER TO OWNER.
6. DEMOLISH MISCELLANEOUS ITEMS SUCH AS PLYWOOD, NAILS, HOOKS, ETC., FROM WALLS & PATCH AS INDICATED IN THESE DOCUMENTS.

ARCHITECTURAL DEMOLITION NOTES:

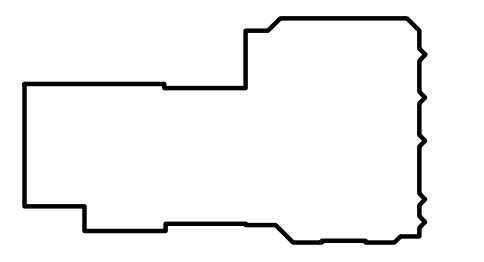
- 1 FLOORS
 - A. REMOVE AND PROPERLY DISPOSE OF FLOORING, BASE, AND ACCESSORIES. PREP REMAINING SURFACES TO RECEIVE NEW FINISH.
 - B. SAWCUT AND TRENCH AREA OF CONCRETE FLOOR SLAB AS INDICATED FOR THE INSTALLATION OF NEW PIPING. REFER TO PLUMBING DRAWINGS.
 - C. EXISTING FLOORING AND BASE TO REMAIN.
- 2 WALLS
 - A. REMOVE AND PROPERLY DISPOSE OF EXISTING WALL CONSTRUCTION AND RELATED BRACINGS/SUPPORTS AS INDICATED. PATCH AND REPAIR REMAINING FLOOR AND/OR WALL SURFACES TO MATCH EXISTING AND/OR TO RECEIVE NEW FINISH OR OTHER CONSTRUCTION.
 - B. REMOVE AND PROPERLY DISPOSE OF EXISTING WALL CONSTRUCTION AS REQUIRED BY NEW DOOR OPENING.
 - C. NOT USED
- 3 CEILINGS
 - A. MODIFY/ALTER CEILING CONSTRUCTION AS REQUIRED BY REMODELING. MAINTAIN THE FIRE RESISTANCE RATING OF THE EXISTING CEILING ASSEMBLY. PATCH AND PREPARE SURFACES FOR NEW FINISHES. COORDINATE ALL NECESSARY ELECTRICAL AND MECHANICAL REMOVAL AND REPLACEMENT WITH ELECTRICAL AND MECHANICAL CONTRACTORS.
 - B. REMOVE AND PROPERLY DISPOSE OF FINISH CEILING MATERIAL AS REQUIRED FOR THE INSTALLATION OF MECHANICAL DIFFUSERS. REFER TO MECHANICAL DRAWINGS.
 - C. REMOVE AND RETAIN ACOUSTICAL CEILING TILE AS REQUIRED FOR REMODEL. ANY CEILING TILES DISTURBED DUE TO MECHANICAL & ELECTRICAL COORDINATION TO BE REPLACED, MATCH EXISTING.
- 4 DOORS
 - A. REMOVE AND PROPERLY DISPOSE OF INTERIOR DOOR, INCLUDING FRAME, SIDELIGHTS, CASING AND ALL RELATED ANCHORS AND SUPPORTS. SAWCUT ALL FRAME ANCHORS - PRYING ANCHORS FROM SUBSTRATES IS UNACCEPTABLE, UNLESS SUPPORTING WALL IS TO BE REMOVED.
 - B. REMOVE AND PROPERLY DISPOSE OF EXISTING DOORS, EXISTING FRAME TO REMAIN.
- 5 WINDOWS
 - A. REMOVE AND PROPERLY DISPOSE OF WINDOWS / STOREFRONT / BORROWED LIGHT / LOUVER INCLUDING FRAME ASSEMBLY, SILL AND ALL RELATED ANCHORS, SUPPORTS AND HARDWARE. SAWCUT ALL ANCHORS - PRYING ANCHORS FROM SUBSTRATES IS UNACCEPTABLE.
 - B. HIDE EXISTING OPENING FOR THE INSTALLATION OF NEW EGRESS WINDOW AS SCHEDULED.
- 6 CASEWORK
 - A. REMOVE AND PROPERLY DISPOSE OF CASEWORK (UPPER AND LOWER WHERE SHOWN) INCLUDING SUPPORTS, ANCHORS, DUCTWORK, GRILLES AND HARDWARE. PATCH SURFACES TO REMAIN AND PREP SURFACES FOR NEW FINISHES. REFER TO MECHANICAL & ELECTRICAL PLANS FOR ADDITIONAL INFORMATION.
 - B. REMOVE AND PROPERLY DISPOSE OF COUNTERTOPS AND BACK SPLASH AND SINKS. PATCH AND REPAIR WALLS AND CABINETS TO MATCH EXISTING ADJACENT CONSTRUCTION.
- 7 EQUIPMENT
 - A. REMOVE AND PROPERLY DISPOSE OF WOOD TRIM, PLAQUES, AND DISPLAY CASES AND RETURN TO OWNER. REMOVE ALL MASTICS AND ANCHORS AND PREP WALL TO RECEIVE NEW FINISHES.
- 8 TOILET FIXTURES AND ACCESSORIES
 - A. REMOVE AND PROPERLY DISPOSE OF WATER CLOSETS, SINKS AND LAVATORIES. REMOVE ALL ANCHORS, BRACKETS AND PREP WALL & FLOOR TO RECEIVE NEW FINISHES. TURN OFF WATER AND CAP AT ABANDONED PLUMBING LOCATIONS.
 - B. REMOVE AND PROPERLY DISPOSE OF TOILET PARTITIONS, REMOVE ALL ANCHORS, BRACKETS.
 - C. REMOVE AND PROPERLY DISPOSE OF GRAB BARS, COUNTERS, MIRRORS, SOAP AND PAPER DISPENSERS, PREP WALL TO RECEIVE NEW FINISHES.
- 9 MISCELLANEOUS
 - A. REMOVE AND PROPERLY DISPOSE OF SHELVING AND ALL MISCELLANEOUS WALL MOUNTED ITEMS. PATCH AND REPAIR WHERE NEEDED. COORDINATE WITH OTHER DISCIPLINES.
 - B. ALTER AND PROPERLY DISPOSE OF COUNTER, ADJUST REFRIGERATOR & RANGE LOCATION AS REQUIRED TO MAINTAIN BARRIER FREE CLEARANCE. PREP WALL TO RECEIVE NEW FINISH. COORDINATE WITH OTHER DISCIPLINES.
 - C. REMOVE AND RETURN TO OWNER DISPOSITION WALL MOUNTED WOOD CROSS, PATCH AND REPAIR WHERE NEEDED. COORDINATE WITH OTHER DISCIPLINES.
 - D. REMOVE AND PROPERLY DISPOSE EXISTING CASEWORK, PATCH AND PREPARE WHERE NEEDED. COORDINATE WITH OTHER DISCIPLINES.

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KEY PLAN



JOB NO. 2616.04 NORTH

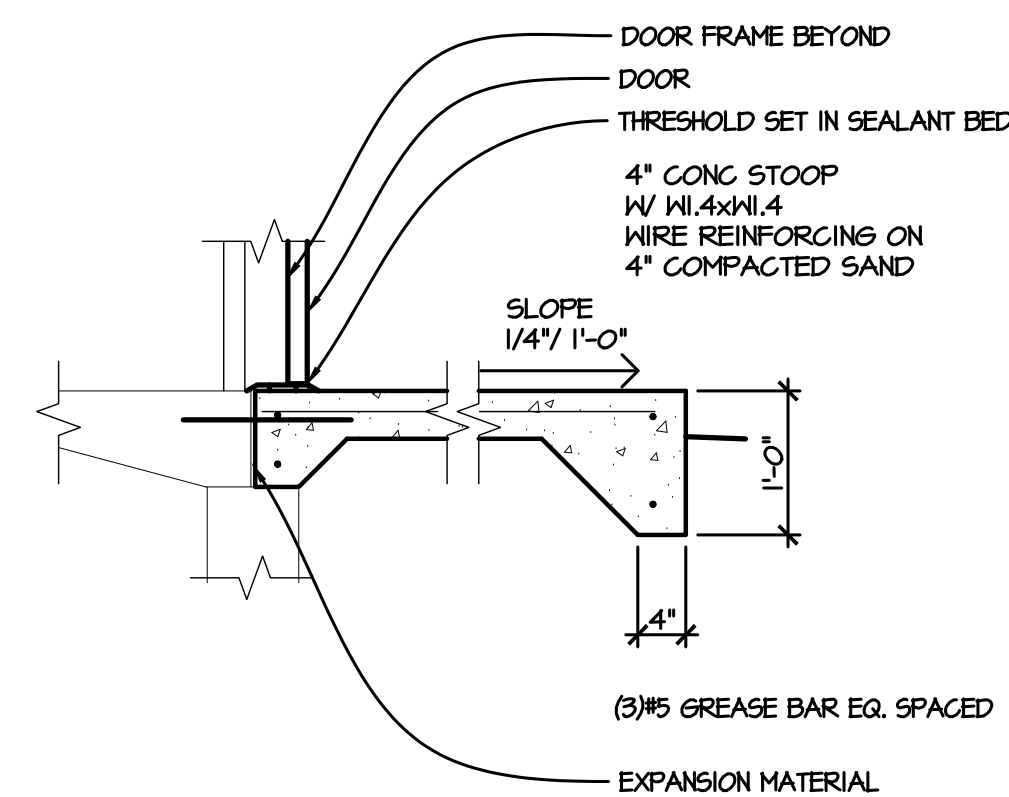
SHEET TITLE
DEMOLITION FLOOR & REFLECTED CEILING PLANS
SHEET NO.

D1.1

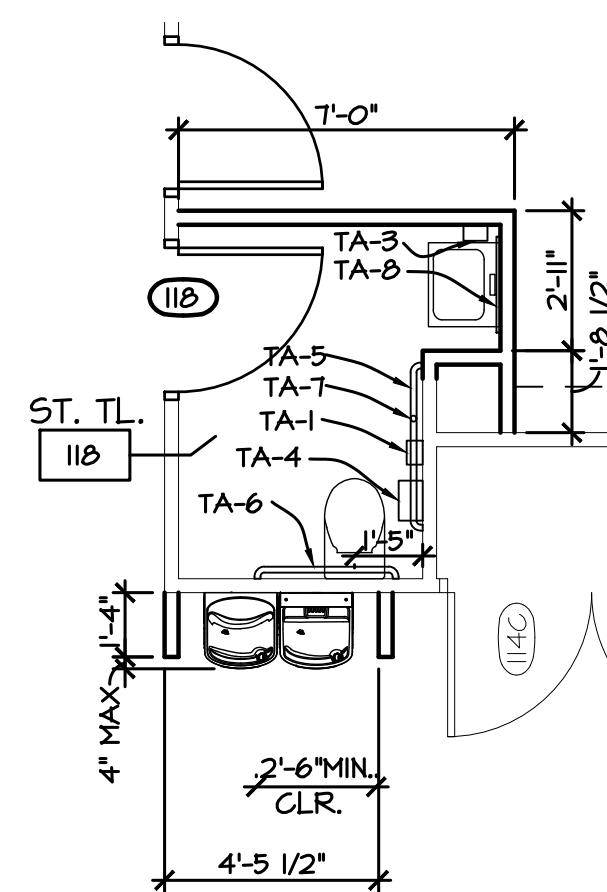
TOILET ACCESSORIES	
REFER TO SPECIFICATION SECTION 102800	
MARK	DESCRIPTION
TA-1	TOILET TISSUE DISPENSER - BY OWNER
TA-2	PAPER TOWEL DISPENSER - BY OWNER
TA-3	SOAP DISPENSER - BY OWNER
TA-4	SANITARY NAPKIN DISPOSAL UNIT
TA-5	GRAB BAR - 42"
TA-6	GRAB BAR - 36"
TA-7	VERTICAL GRAB BAR 18"
TA-8	MIRROR - 2'-0" W x 3'-0" H MOUNTED AT 36" A.F.F.

GENERAL TOILET ACCESSORY NOTES:

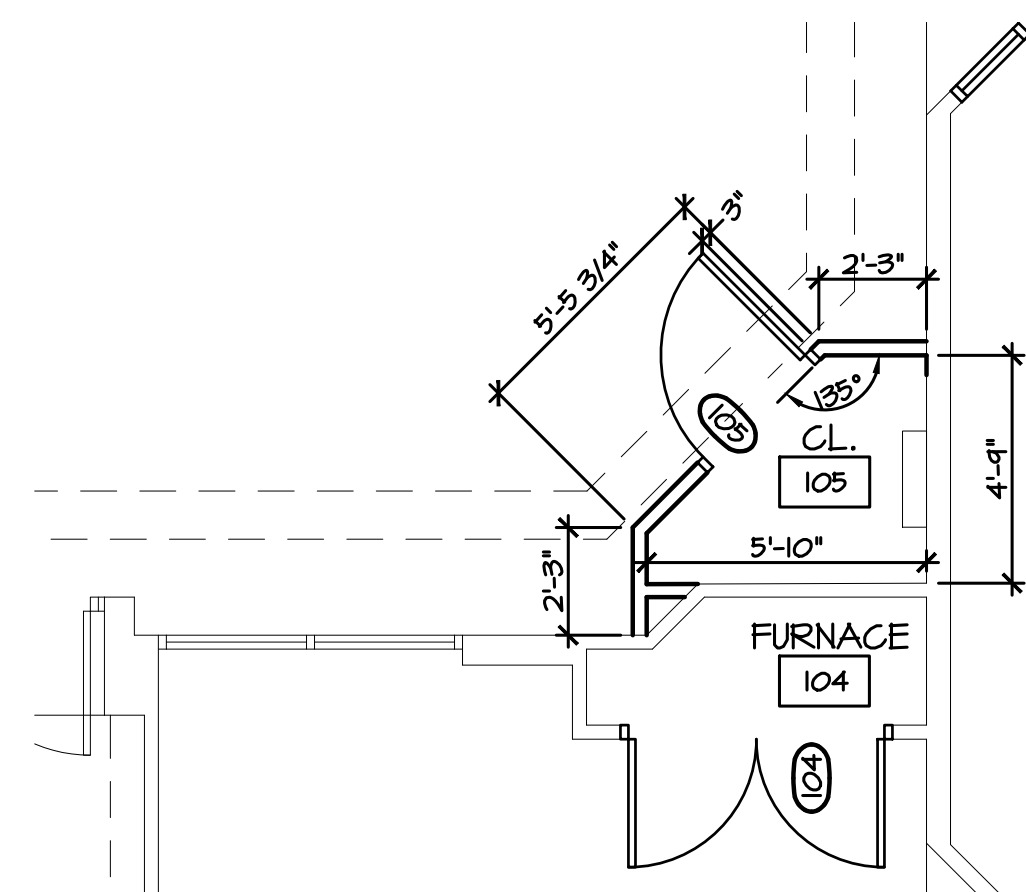
1. INSTALL UNDER-LAVATORY GUARDS AT EACH LAVATORY PLUMBING CONNECTION PER SPECIFICATION SECTION.
2. SEE EQUIPMENT PLANS FOR ADDITIONAL ACCESSORIES NOT LOCATED IN TOILET ROOMS.
3. TOILET ACCESSORIES NOT 'BY OWNER' SHALL BE CONTRACTOR INSTALLED.
4. ← SLOPE FLOOR MIN. 1/8" PER FOOT TO DRAIN U.N.O.
5. SEE SHEET 62 FOR MOUNTING HEIGHTS.



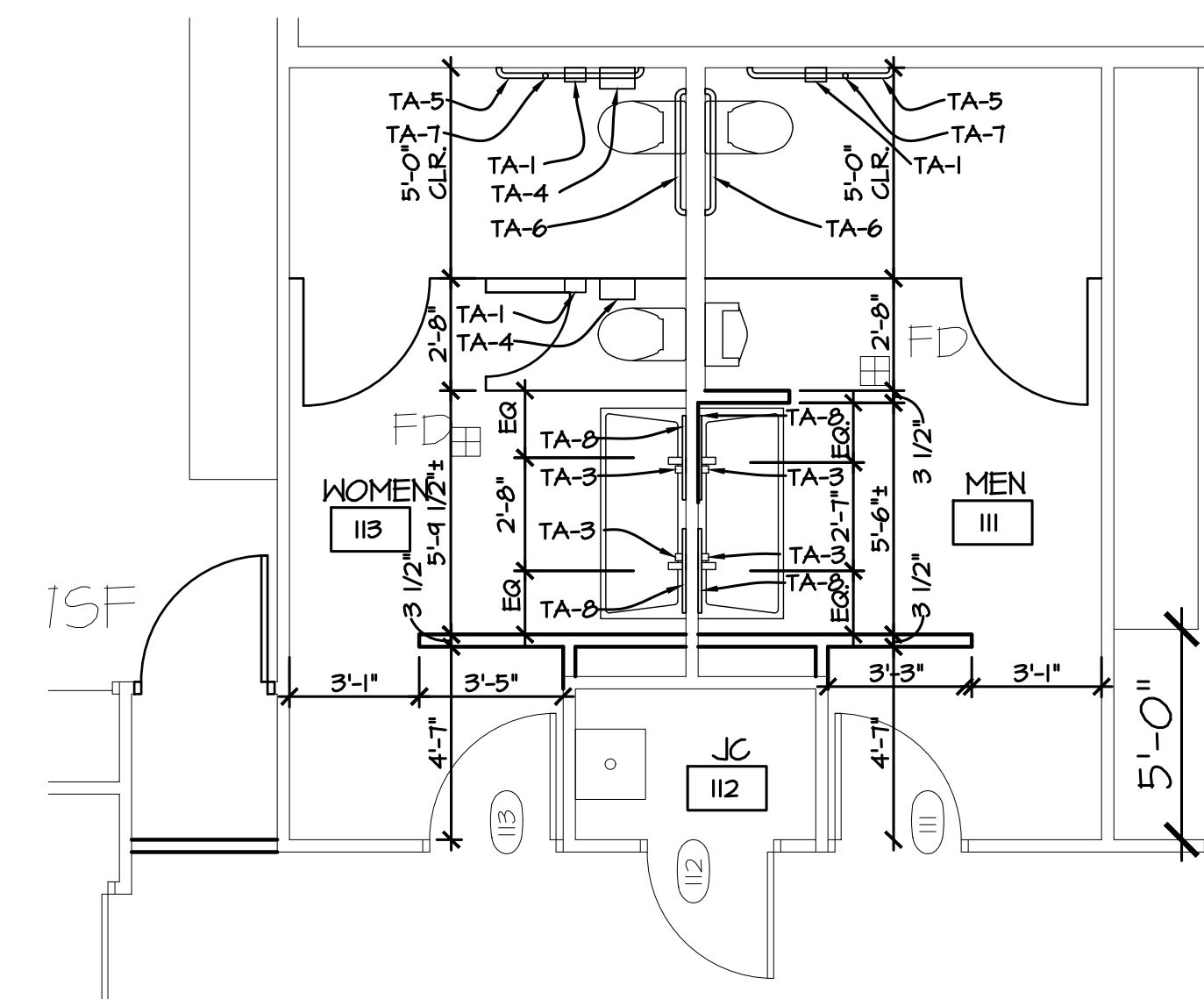
5 CONC. STOOP
SCALE: 3/4" = 1'-0"



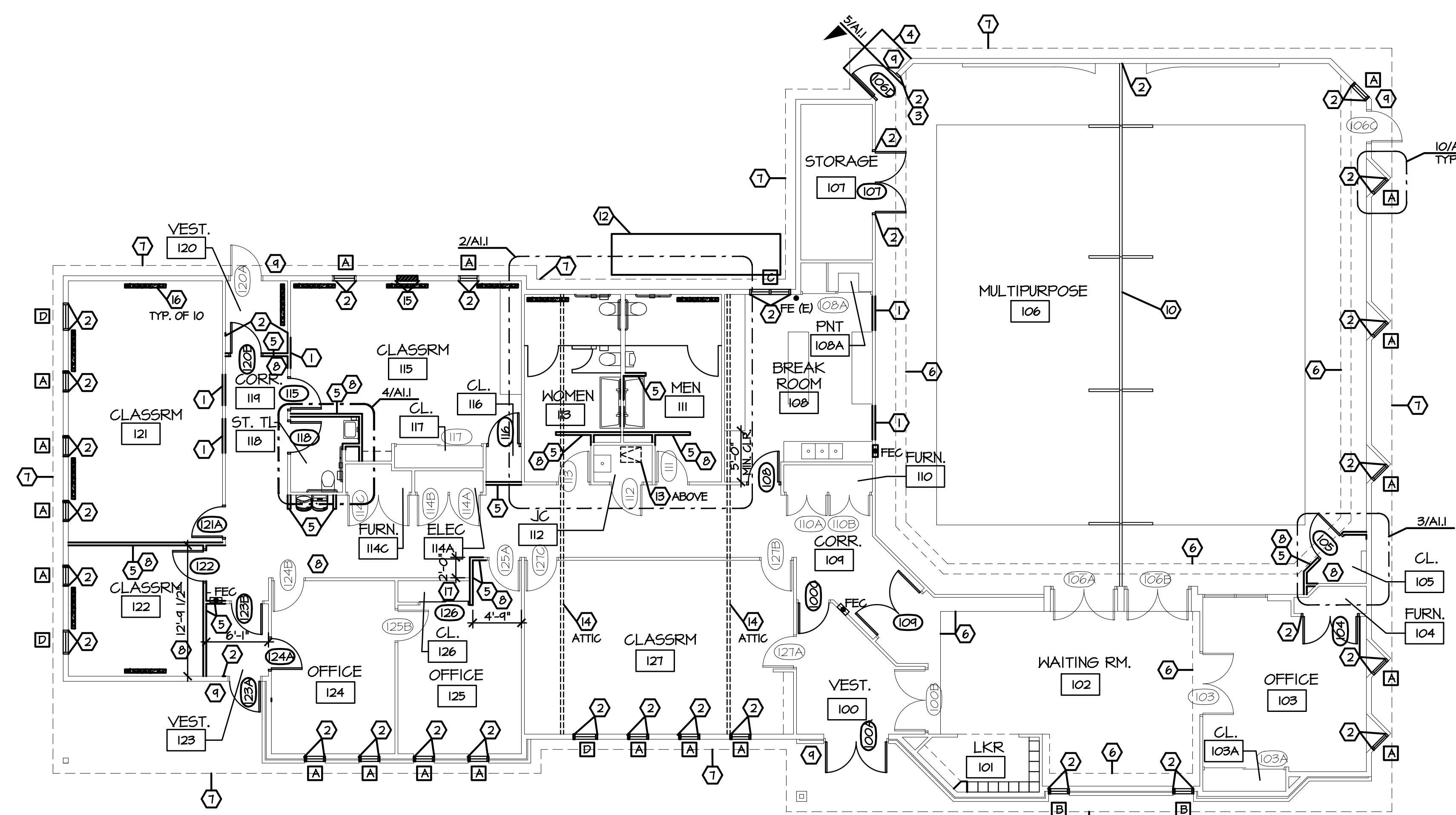
4 TOILET ROOM 118
SCALE: 1/4" = 1'-0"



3 ELEC. CLOSET 105
SCALE: 1/4" = 1'-0"



2 TOILET ROOMS 111 AND 113
SCALE: 1/4" = 1'-0"



1 FLOOR PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. [XXXX] INDICATES CONSTRUCTION DOCUMENTS ROOM NUMBERS.
2. [X] INDICATES WINDOWS, STOREFRONT, OR LOUVERS. REFER TO DRAWING A6.1 FOR SIZES.
3. [XXX] INDICATES DOOR/BORROWED LIGHT. REFER TO FRAME TYPES FOR EXTERIOR DOOR & STOREFRONT SIZES. REFER TO SHEET A6.1 FOR DOOR SCHEDULE AND DETAILS.
4. [XXX] INDICATES EXISTING DOORS; REFER TO A6.1 DOOR SCHEDULE.
5. REFER TO SHEET 62 FOR FLOOR PLAN SYMBOLS LEGEND.
6. REFER TO DEMOLITION PLANS FOR ADDITIONAL NOTES REGARDING PATCHING AT AREAS OF REMOVAL AND/OR ALTERATIONS. COORD. WITH MECHANICAL, ELECTRICAL, AND PLUMBING CONTRACTORS.
7. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS LISTED AS 'MATCH EXISTING', 'EXISTING', OR PLUS OR MINUS (±).
8. ALL PARTITIONS TO RUN TIGHT TO GYP. BD. ATTACHED TO BOTTOM CORD OF ROOF TRUSSES (U.N.O.). B/D ROOF TRUSS CORD = 8'-4".
9. DIMENSIONS SHOWN ARE TO FACE OF WOOD STUDS.
10. ALL RECESSES IN FIRE WALLS SHALL HAVE MULTIPLE LAYERS OF GYP. BOARD TO MAINTAIN FIRE RATING. SEE CODE COMP. PLAN.
11. FILL/SEAL ALL PENETRATIONS, INCLUDING OPENINGS WHERE PIPING AND DUCTWORK HAS BEEN REMOVED, THROUGH WALLS AND VOIDS AT STRUCTURAL MEMBERS. USE FIRE RATED PATCHING MATERIALS IN RATED WALLS IDENTIFIED ON THE CODE COMPOSITE PLAN.
12. REPAIR EXISTING GYPSUM PLASTER AT ALL AREAS OF DEMOLITION TO MATCH EXISTING.

KEY NOTES:

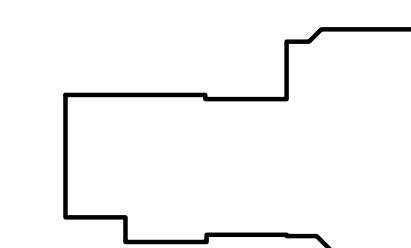
1. INFILL WITH HD. STUD, SOUND ATTENUATION, AND GYP BOARD WALL CONSTRUCTION. MATCH EXISTING ADJACENT WALL.
2. PATCH/REPAIR EXISTING WALL CONSTRUCTION TO MATCH ADJACENT AREAS WHERE DISTURBED BY REMOVAL/DEMOLITION WORK.
3. NEW OPENING FOR DOOR SHALL INCLUDE NEW LINTEL(S). REFER TO DOOR HEAD DETAIL FOR ADDITIONAL INFORMATION.
4. 4'x5'x4" CONC. STOOP W/ TURN DOWN EDGES
5. NEW WALL CONSTRUCTION 2x4 HD STUDS @16" OC, SOUND ATTENUATION, 1/2" GYP. BD. EA. SIDE W/ VENEER PLASTER FINISH TO MATCH EXISTING.
6. LINE OF BULKHEAD ABOVE
7. LINE OF ROOF OVERHANG ABOVE
8. PATCH EXISTING CEILING TO MATCH ADJACENT AREAS WHERE DISTURBED BY REMOVAL/DEMOLITION WORK.
9. 12"x12" EXTERIOR ALUMINUM PANEL SIGNAGE W/ VINYL NUMBERING LOCATED ON EXTERIOR AND INTERIOR OF ALL EXTERIOR DOORS.
10. 84" TALL CLOTH PARTITION WALLS BY OWNER
11. AREA OF PREVIOUS FLOOR REGISTER. INFILL WITH CONCRETE PRIOR TO FLOORING.
12. 4'x16'-6"x4" CONC. PAD FOR SITE MECHANICAL EQUIPMENT. PROVIDE 24" CLR ON ALL SIDES. COORD. W/ MECHANICAL DRAWINGS.
13. EXISTING ATTIC ACCESS OPENINGS. VERIFY OPENING IN FIELD, PROVIDE NEW FIRE RATED ATTIC ACCESS CEILING HATCH.
14. REVIEW & PATCH EXISTING ATTIC DRAFT STOP WALLS AND INSTALL OSEB/HINGED ACCESS DOOR W/ HASP.
15. INFILL WALL OPENING WITH HD. STUD, THERMAL BATT INSULATION, GYP BOARD ON INTERIOR SIDE, AND VINYL SIDING ON EXTERIOR SIDE TO MATCH ADJACENT.
16. CONCRETE INFILL AREA OF FLOOR WHERE HVAC REGISTERS HAVE BEEN DEMOLISHED PRIOR TO FLOORING INSTALLATION.
17. PROVIDE AND INSTALL "HOODGRAIN CLOSET SYSTEM". INTERIOR SLIDING DOORS AND TRACK BY "OPEN CLOSE DOORS" OR EQ. PHONE CONTACT (313) 478-8716. EMAIL CONTACT SALES@OPENCLOSEDOORS.COM

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KEY PLAN



JOB NO. 2616.04

SHEET TITLE

FLOOR PLAN, ENLARGED PLANS & DETAILS

SHEET NO.

A1.1

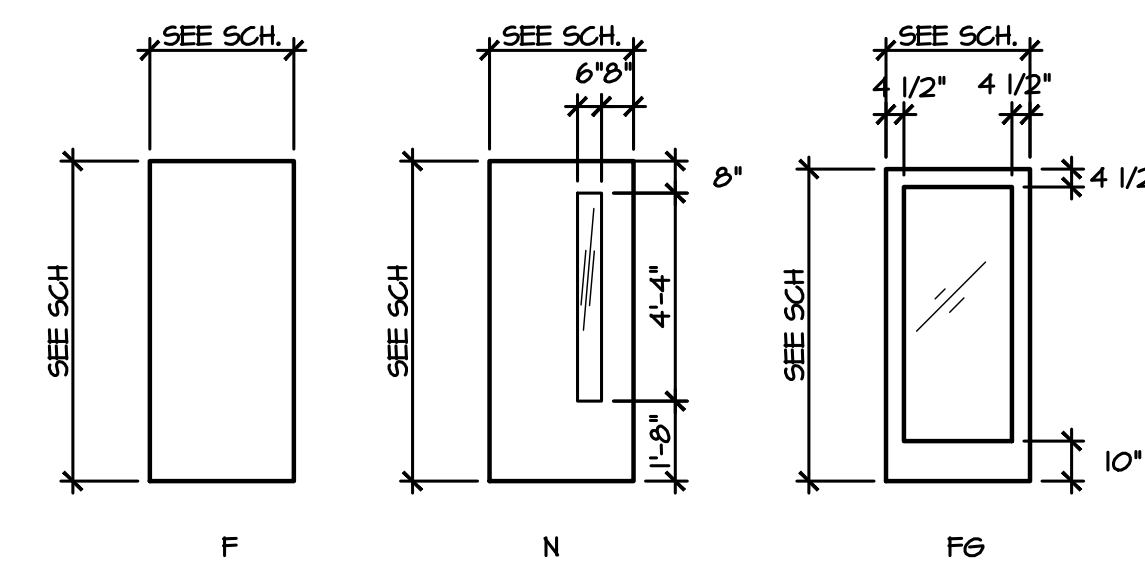
OPNG	DOOR				FRAME					LABEL	REMARKS	EXTERIOR SIGNAGE #		
	SIZE	TYPE	MAT	GLASS	TYPE	MAT	GLASS	HEAD	JAMB				JAMB	SILL
100A	PR3070	F6	AL	1/4'SAF	1	ALUM	-	-	-	-	-	-	NOTE # 3, 4	05, NOTE #6
100B	FR3066	EX	EX	-	-	EX	EX	-	-	-	-	-	NOTE #1	-
100C	3070	F6	AL	1/4'SAF	EX	EX	-	-	-	-	-	-	NOTE #2	-
103	FR3066	EX	EX	-	-	EX	EX	-	-	-	-	-	NOTE #1	-
103A	FR4066	EX	EX	-	-	EX	EX	-	-	-	-	-	-	-
104	PR3066	F	HM	-	2	HM	-	5/A6.2	4/A6.2	-	-	-	45 MIN	ASTRAGAL
105	3070	F	HD	-	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
106A	FR3066	EX	EX	-	-	EX	EX	-	-	-	-	-	NOTE #1	-
106B	FR3066	EX	EX	-	-	EX	EX	-	-	-	-	-	NOTE #1	-
106C	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	NOTE #1	04, NOTE #6
106D	3066	F	HM	-	2	HM	-	17/A6.2	16/A6.2	-	-	-	-	03, NOTE #6
107	FR3066	F	HD	-	2	HM	-	5/A6.2	4/A6.2	-	-	-	45 MIN	NOTE #5
108	3066	N	HD	1/4' SAF	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
108A	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	-	-
109	PR3066	F	HD	1/4' SAF	EX	EX	-	-	-	-	-	-	20 MIN	-
110A	FR2066	EX	EX	-	-	EX	EX	-	-	-	-	-	45 MIN	NOTE #1, 5
110B	FR2066	EX	EX	-	-	EX	EX	-	-	-	-	-	45 MIN	NOTE #1, 5
111	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
112	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
113	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
114A	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	45 MIN	NOTE #1
114B	3066	EX	EX	-	-	EX	EX	-	-	-	-	-	45 MIN	NOTE #1
114C	FR3066	EX	EX	-	-	EX	EX	-	-	-	-	-	45 MIN	NOTE #1, 5
115	3066	N	HD	FRR	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
116	3066	F	HD	-	3	HD	-	10/A6.2	9/A6.2	-	-	-	-	-
117	FR4066	EX	EX	-	-	EX	EX	-	-	-	-	-	-	-
118	3066	F	HD	-	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
120A	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	NOTE #1	02, NOTE #6
120B	3066	N	HM	1/4'SAF	2	HM	-	5/A6.2	4/A6.2	-	-	-	-	-
121A	3066	N	HD	FRR	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
122	3066	N	HD	FRR	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	-
123A	3066	F6	AL	1/4'SAF	EX	EX	-	-	-	-	-	-	NOTE #2, 3;	01, NOTE #6
123B	3066	F6	AL	1/4'SAF	EX	EX	-	-	-	-	-	-	NOTE #2	-
124A	3066	N	HD	FRR	2	HM	-	5/A6.2	4/A6.2	-	-	-	20 MIN	NOTE #1
124B	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
125A	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
125B	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	NOTE #1	-
126	PR2666	F	HD	-	HD	-	10/A6.2	9/A6.2	-	-	-	-	-	-
127A	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
127B	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	20 MIN	NOTE #1
127C	3066	EX	EX	EX	EX	EX	EX	-	-	-	-	-	20 MIN	NOTE #1

HARDWARE SCHEDULE NOTES

- EXISTING DOOR, REPLACE EXISTING HARDWARE WITH ADA COMPLIANT HARDWARE.
- NEW ALUMINUM DOOR, EXISTING ALUMINUM FRAME.
- INSULATED GLAZING IN EXTERIOR DOORS.
- REMOVABLE MULLION.
- EXISTING ASTRAGAL.
- PROVIDE (2) SIGNAGE PANELS, ONE LOCATED ON THE EXTERIOR AND ONE LOCATED ON THE INTERIOR OF EXTERIOR DOORS.

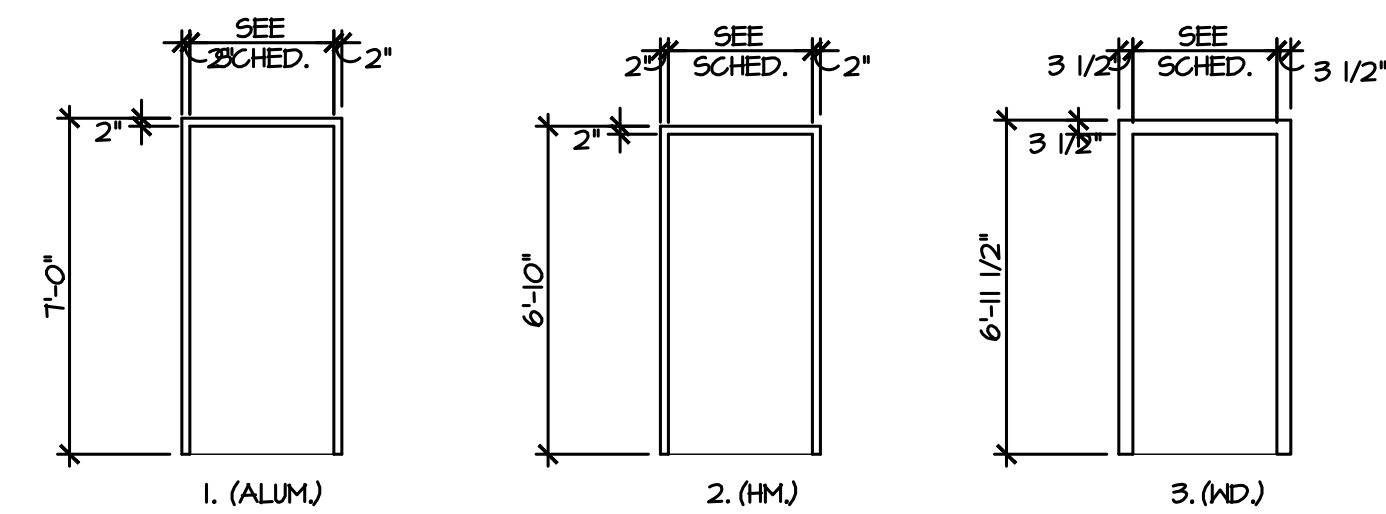
GENERAL NOTES

- EXTERIOR DOORS SHALL BE FABRICATED IN SIZES TO ACCOMMODATE OPENINGS (I.E. UNDERCUT AT BARRIER FREE THRESHOLDS).
- REFER TO SPECIFICATIONS FOR HARDWARE SCHEDULE.



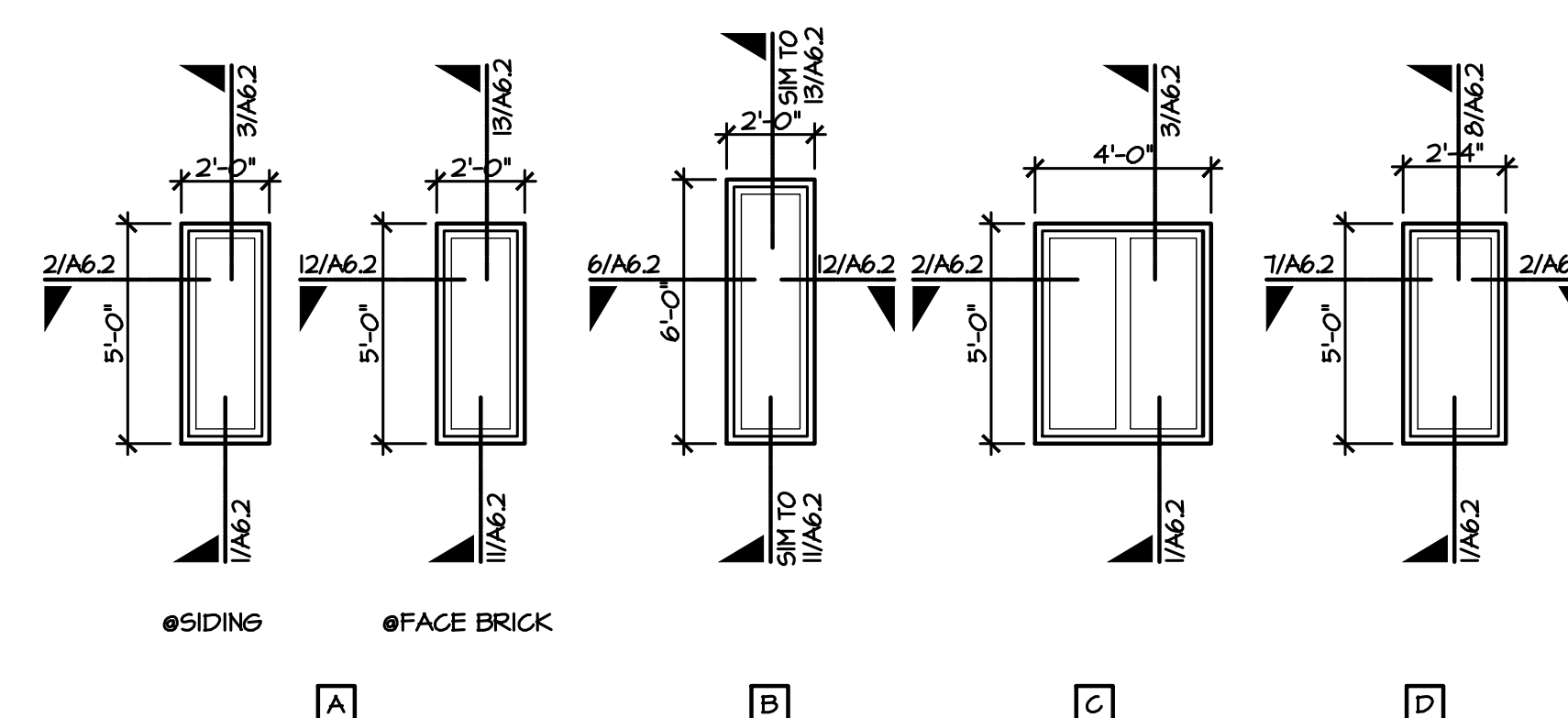
DOOR TYPES

NOTE: ALL DIMENSIONS SHOULD BE VERIFIED IN FIELD PRIOR TO MANUF. OF FRAME.



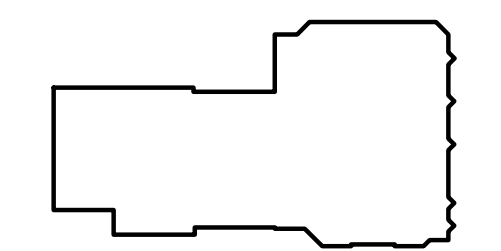
DOOR FRAME TYPES

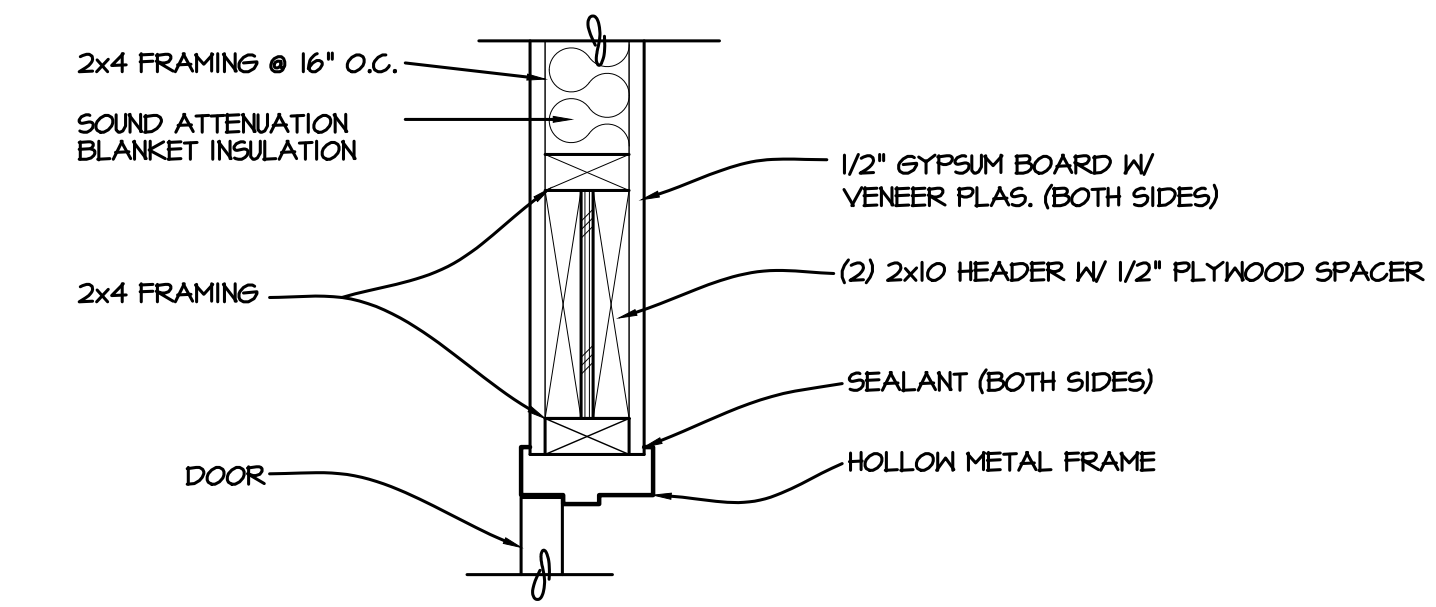
NOTE: ALL DIMENSIONS SHOULD BE VERIFIED IN FIELD PRIOR TO MANUF. OF FRAME.



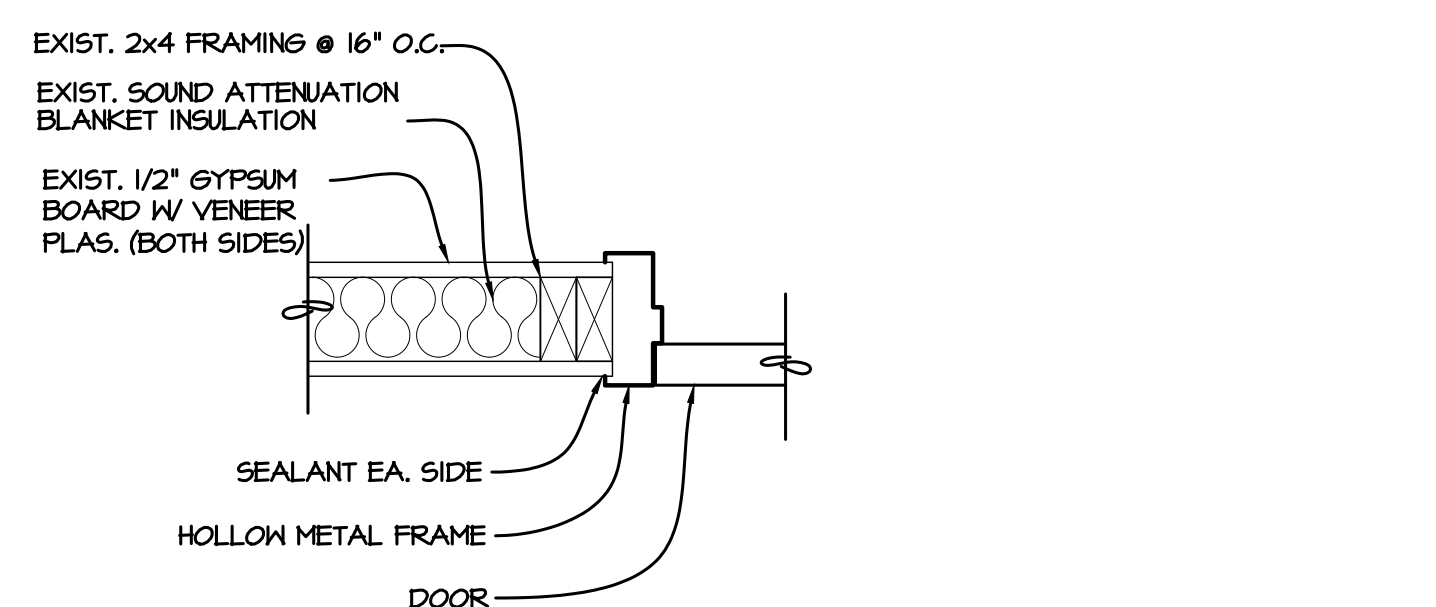
WINDOW FRAME TYPES

NOTE: ALL DIMENSIONS SHOULD BE VERIFIED IN FIELD PRIOR TO MANUF. OF FRAME.

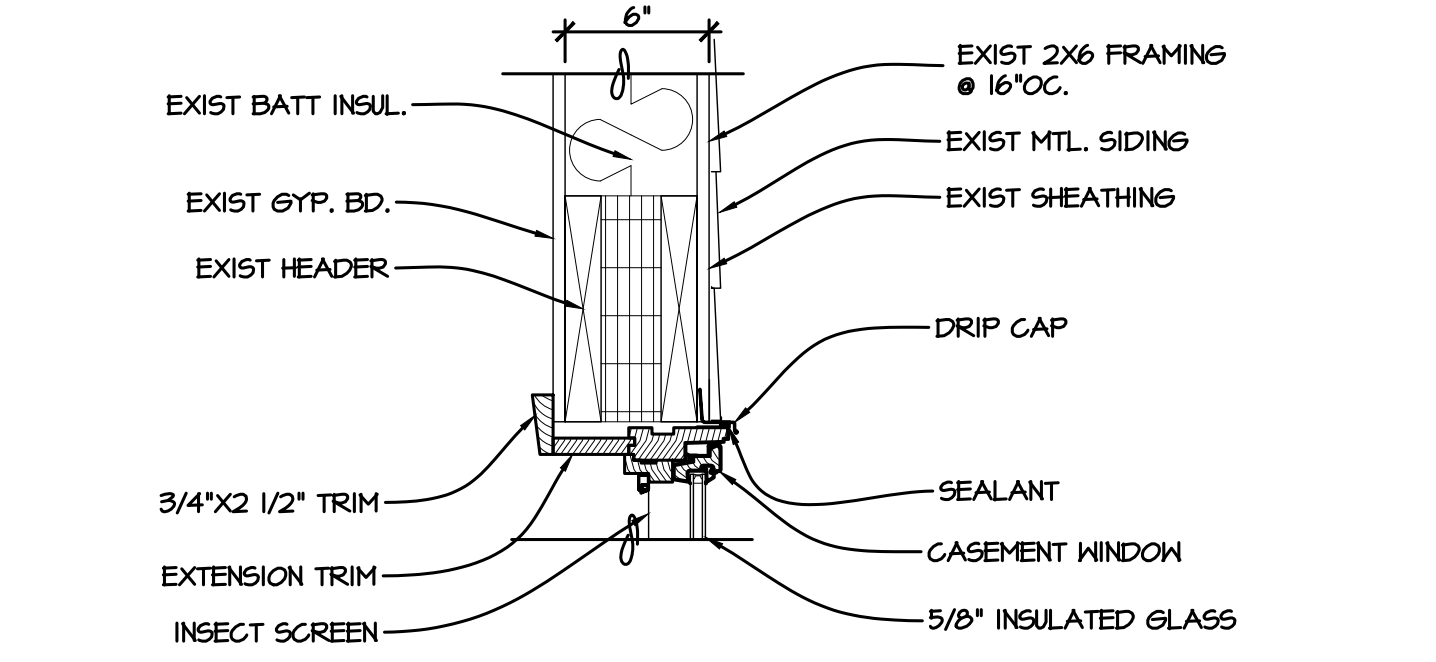




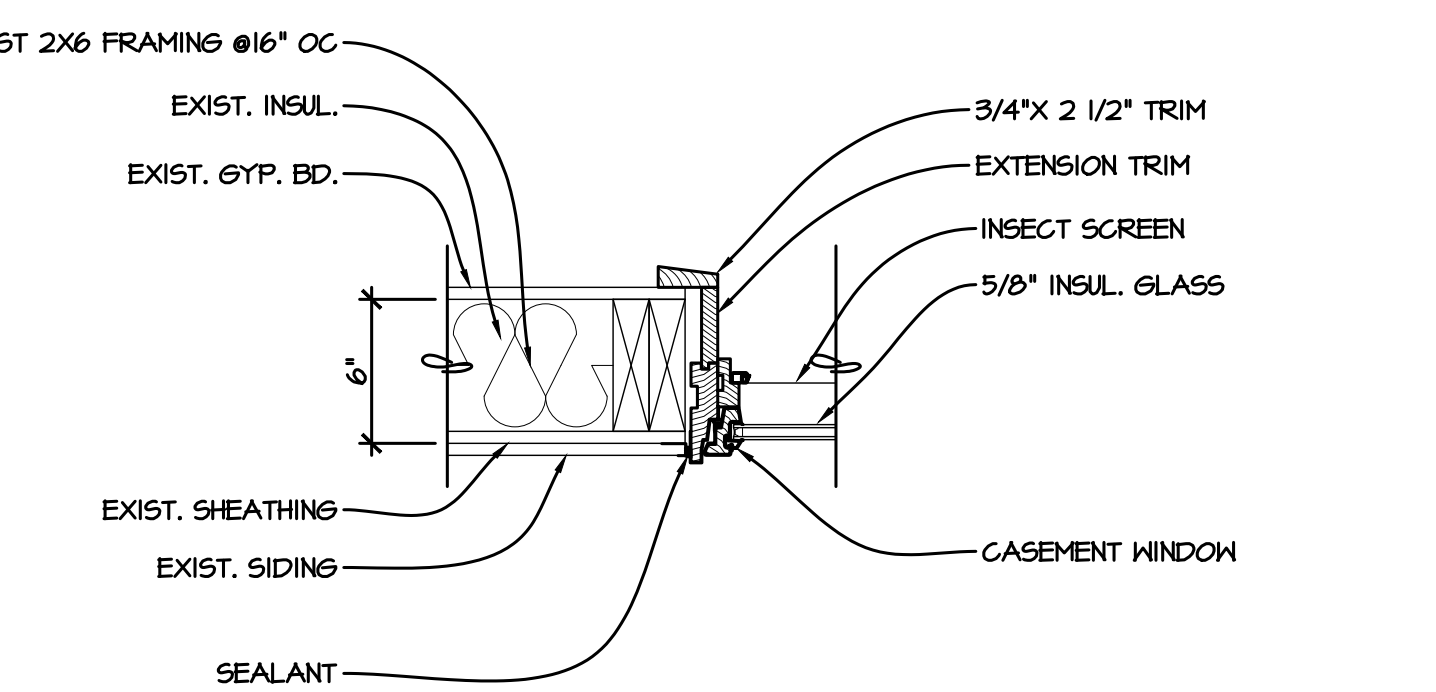
5 HEAD - HOLLOW METAL FRAME
1 1/2"=1'-0"



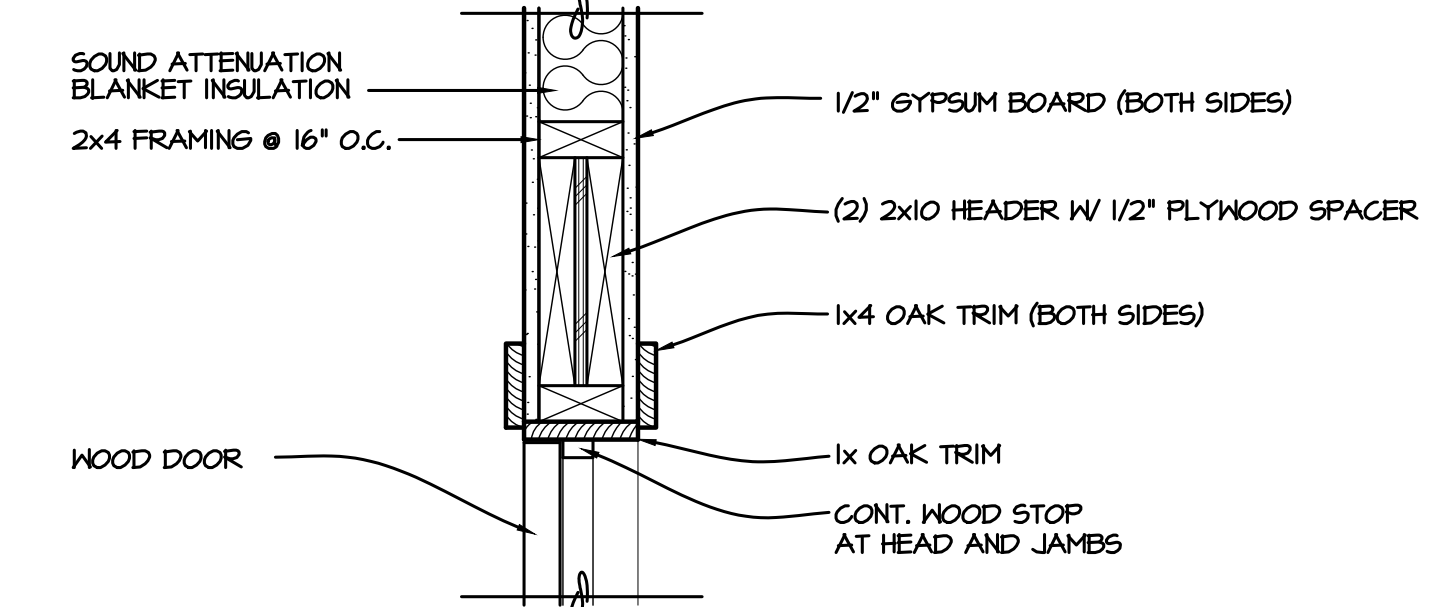
4 JAMB - HOLLOW METAL FRAME
1 1/2"=1'-0"



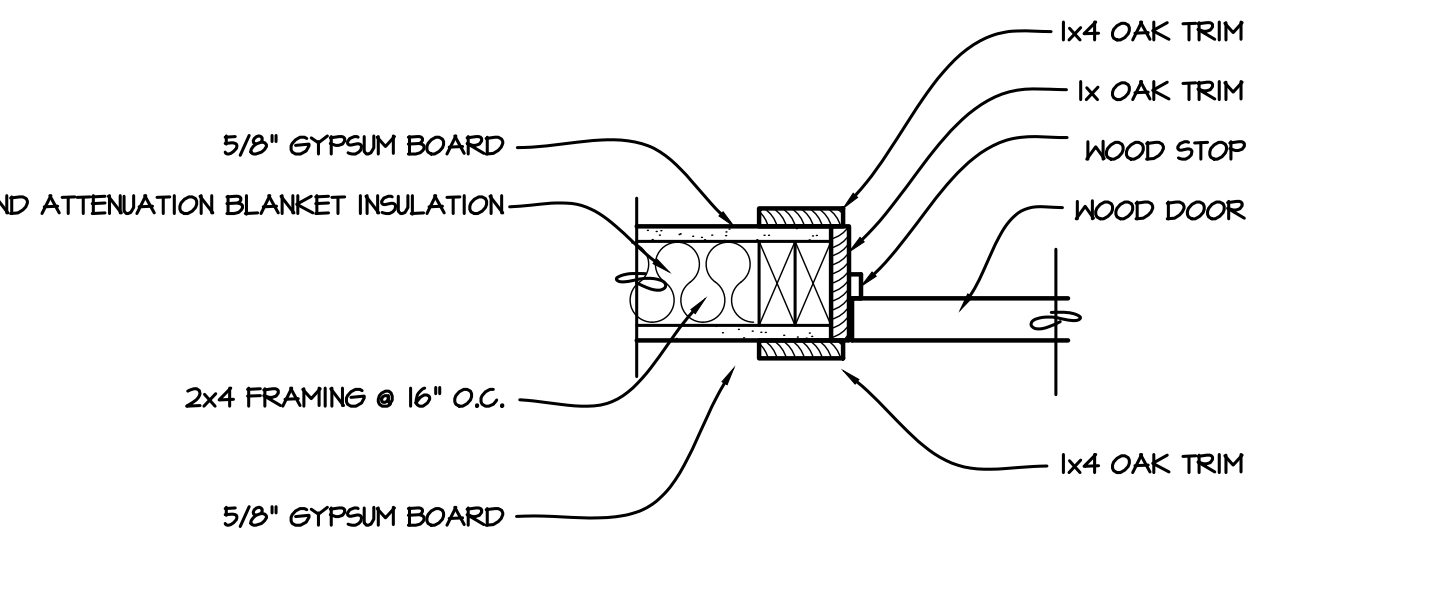
3 HEAD - WINDOW
1 1/2"=1'-0"



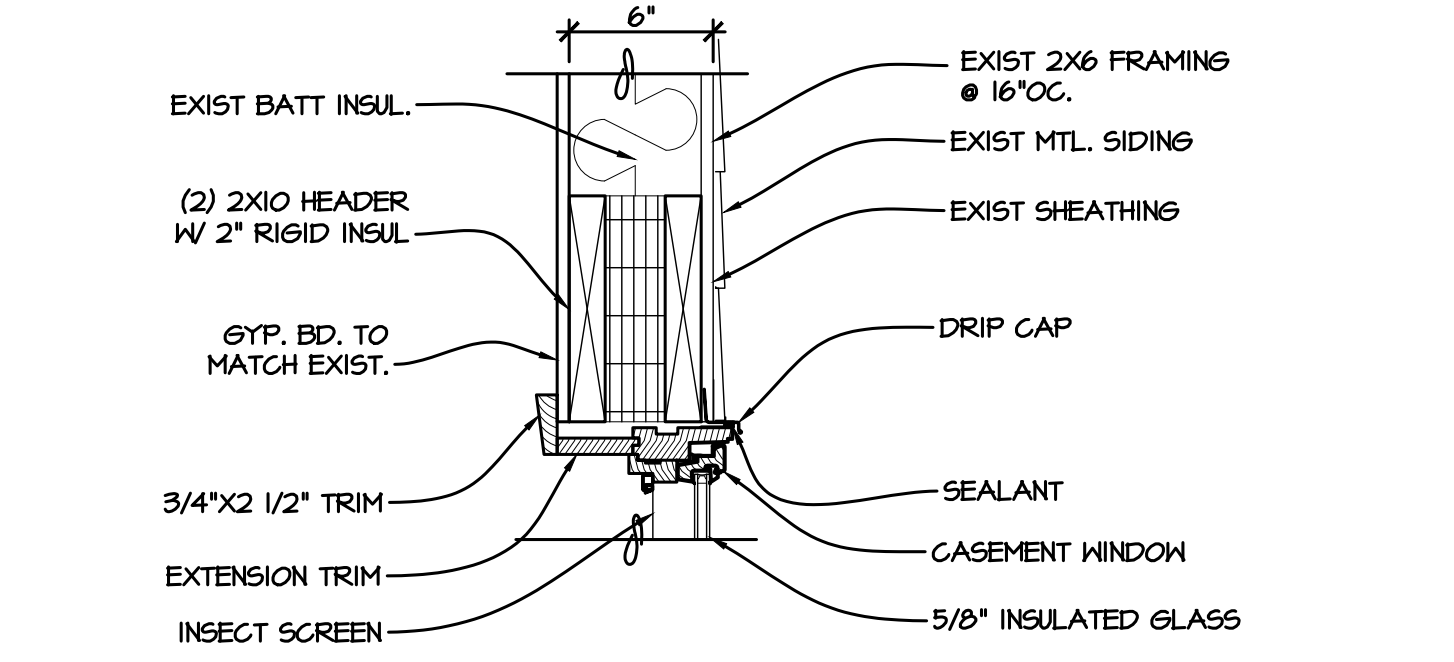
2 JAMB
1 1/2"=1'-0"



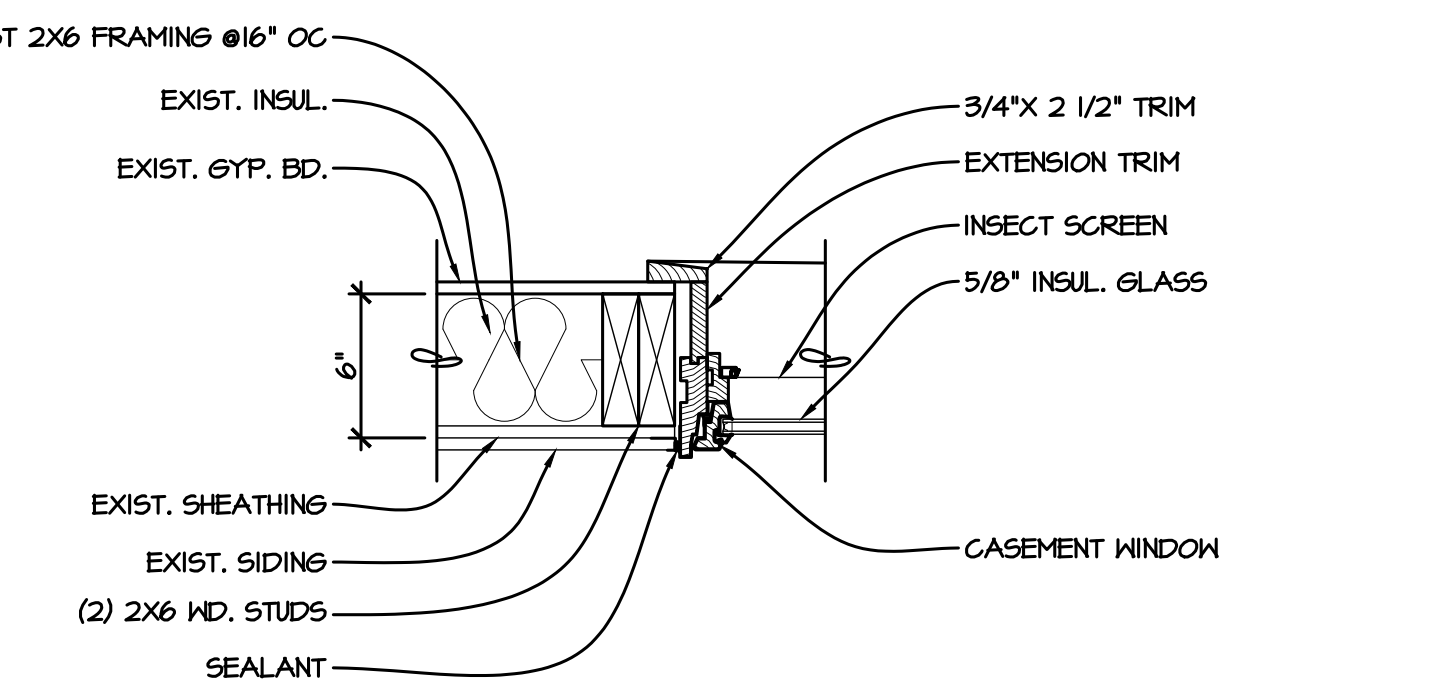
10 HEAD - WOOD FRAME
1 1/2"=1'-0"



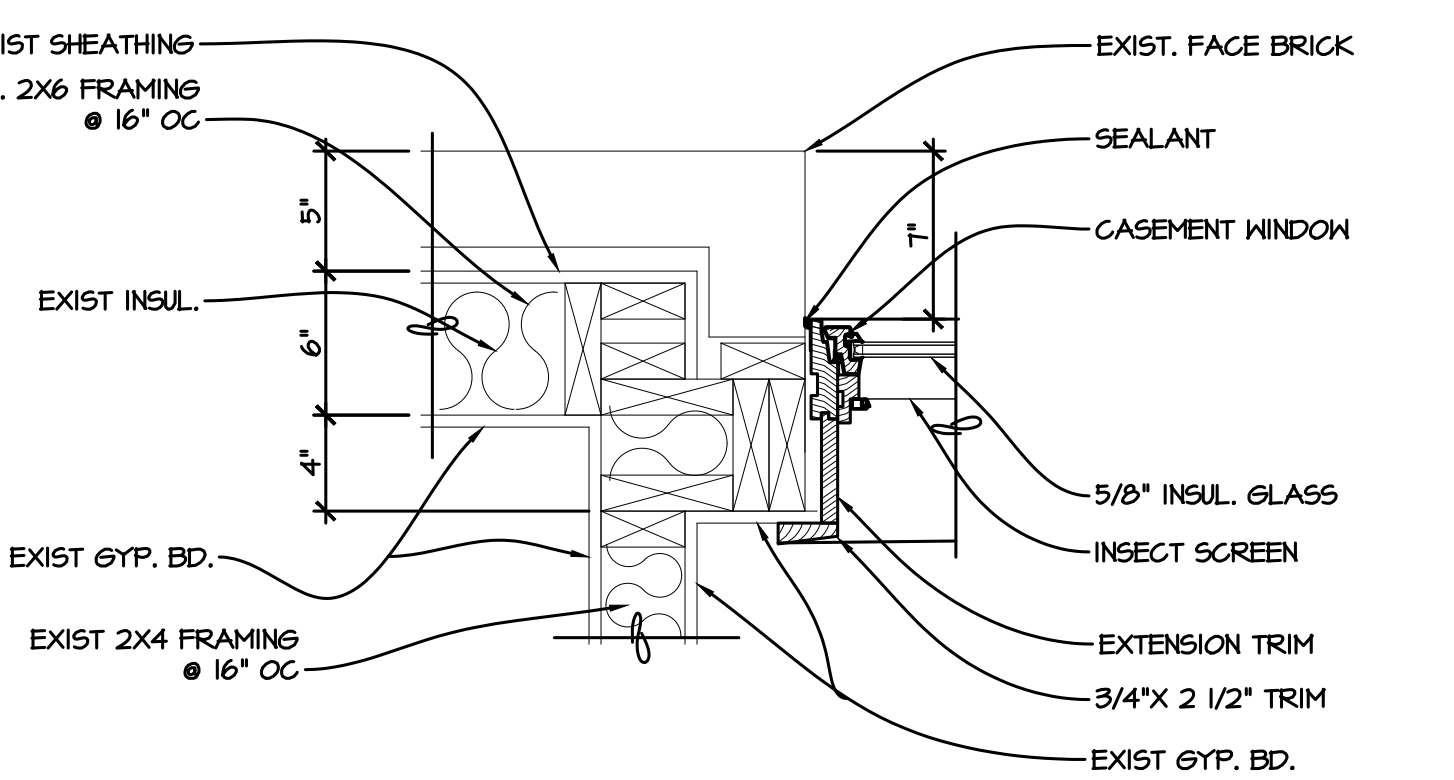
9 JAMB - WOOD FRAME
1 1/2"=1'-0"



8 HEAD - WINDOW @ ALTERED OPG
1 1/2"=1'-0"



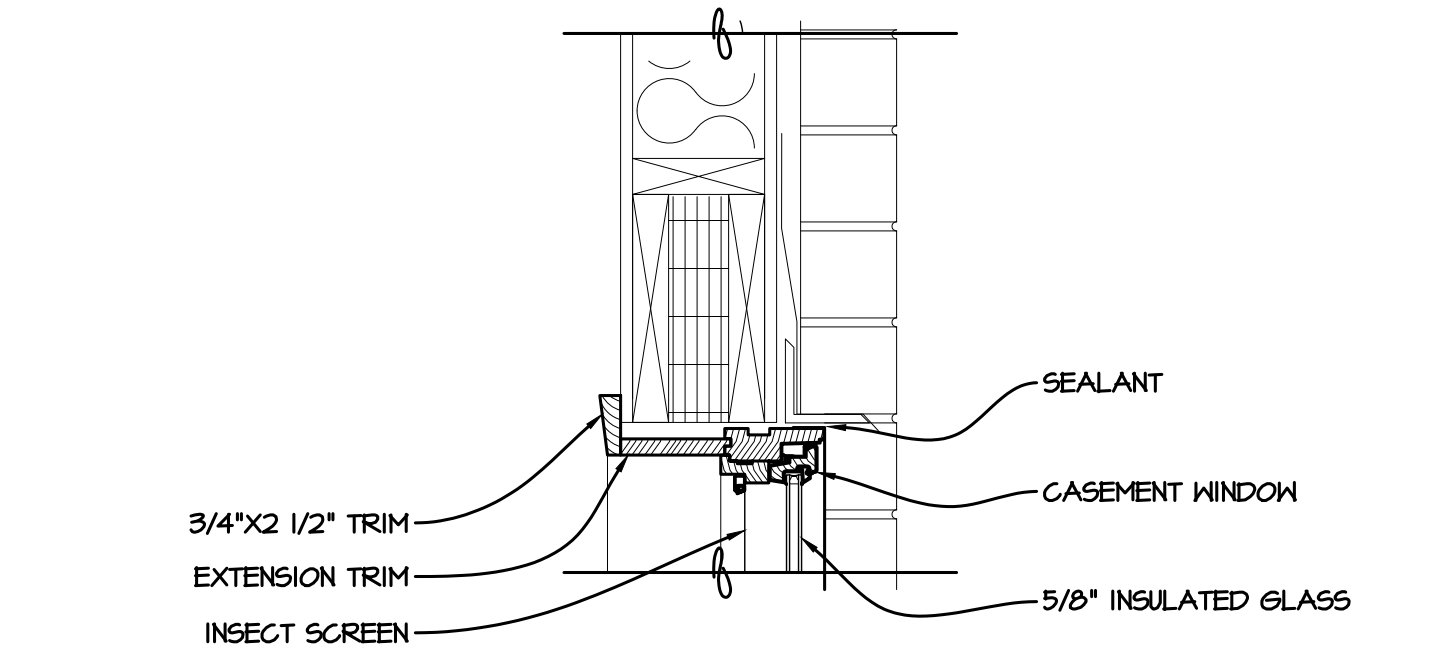
7 JAMB - WINDOW @ ALTERED OPG
1 1/2"=1'-0"



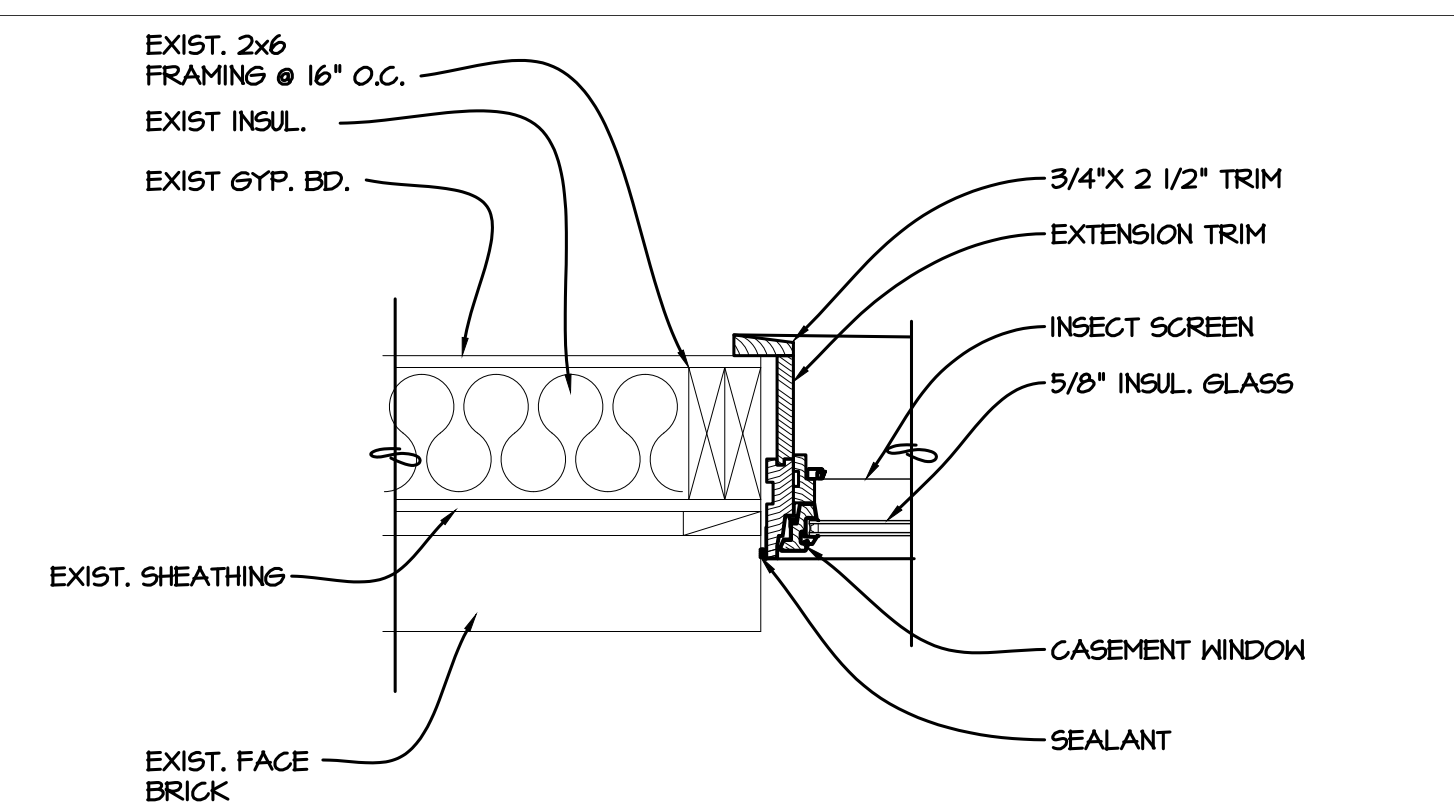
6 JAMB - VINYL CLAD WINDOW
1 1/2"=1'-0"



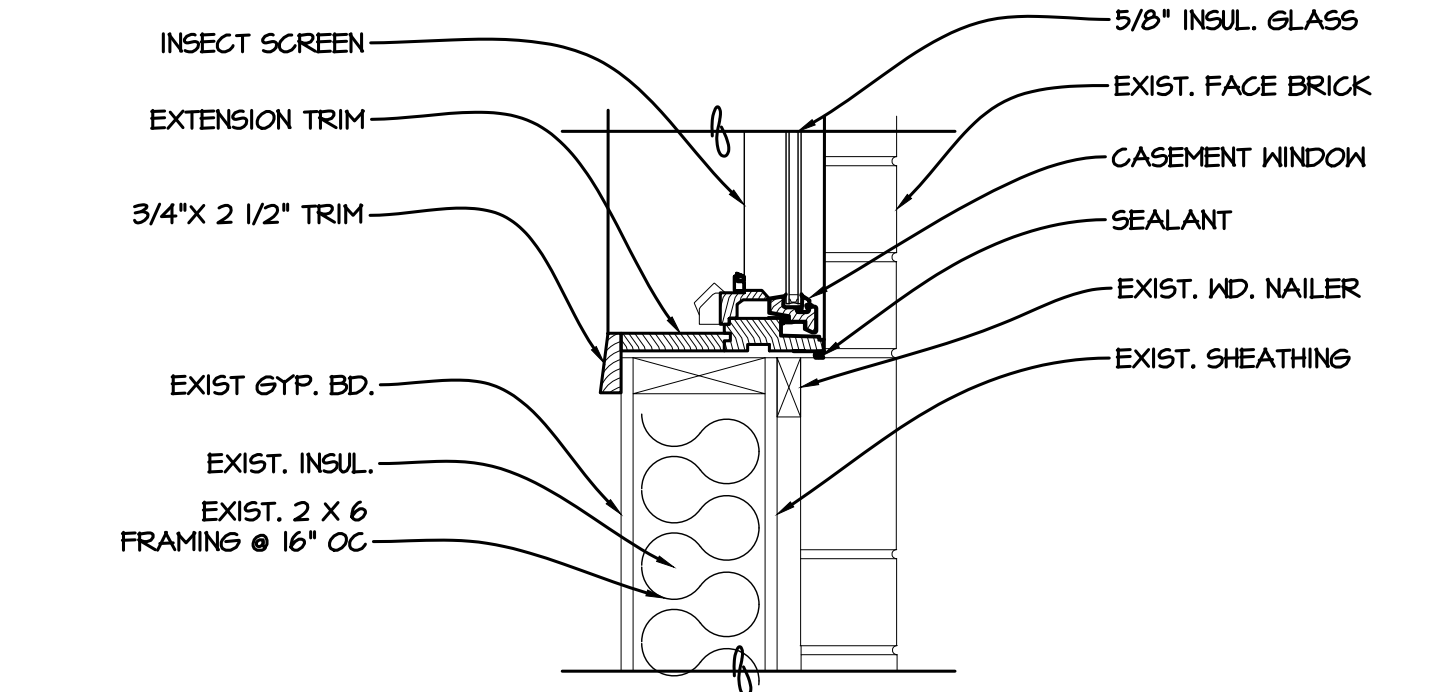
14 NOT USED



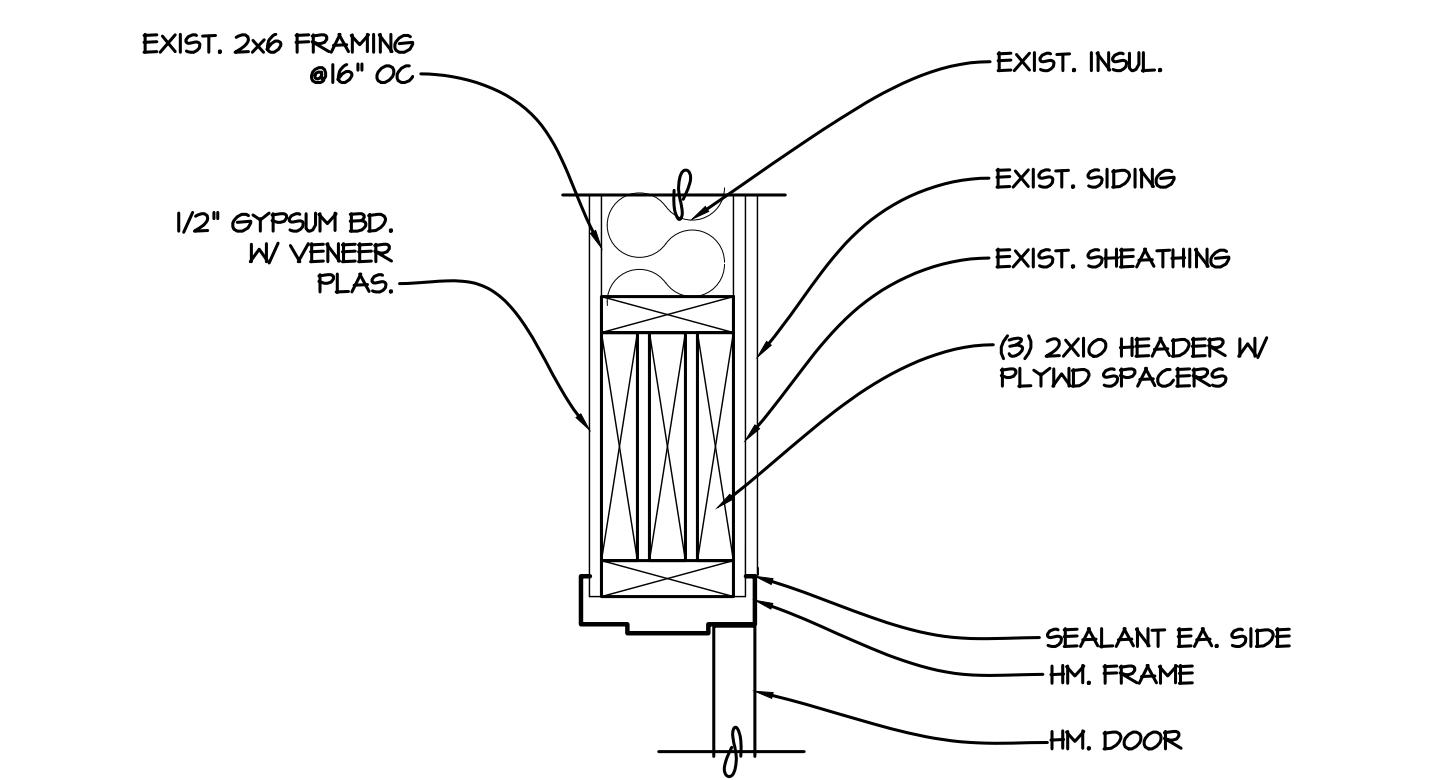
13 HEAD - VINYL CLAD WINDOW
1 1/2"=1'-0"



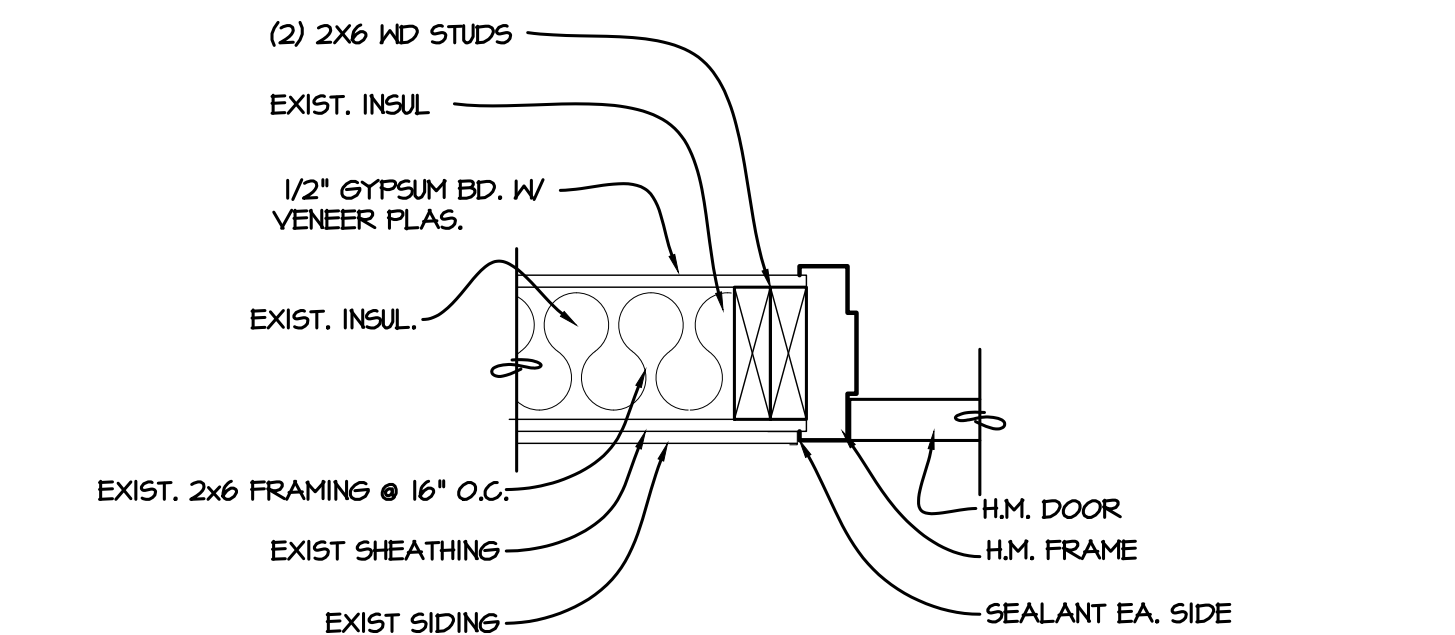
12 JAMB - VINYL CLAD WINDOW
1 1/2"=1'-0"



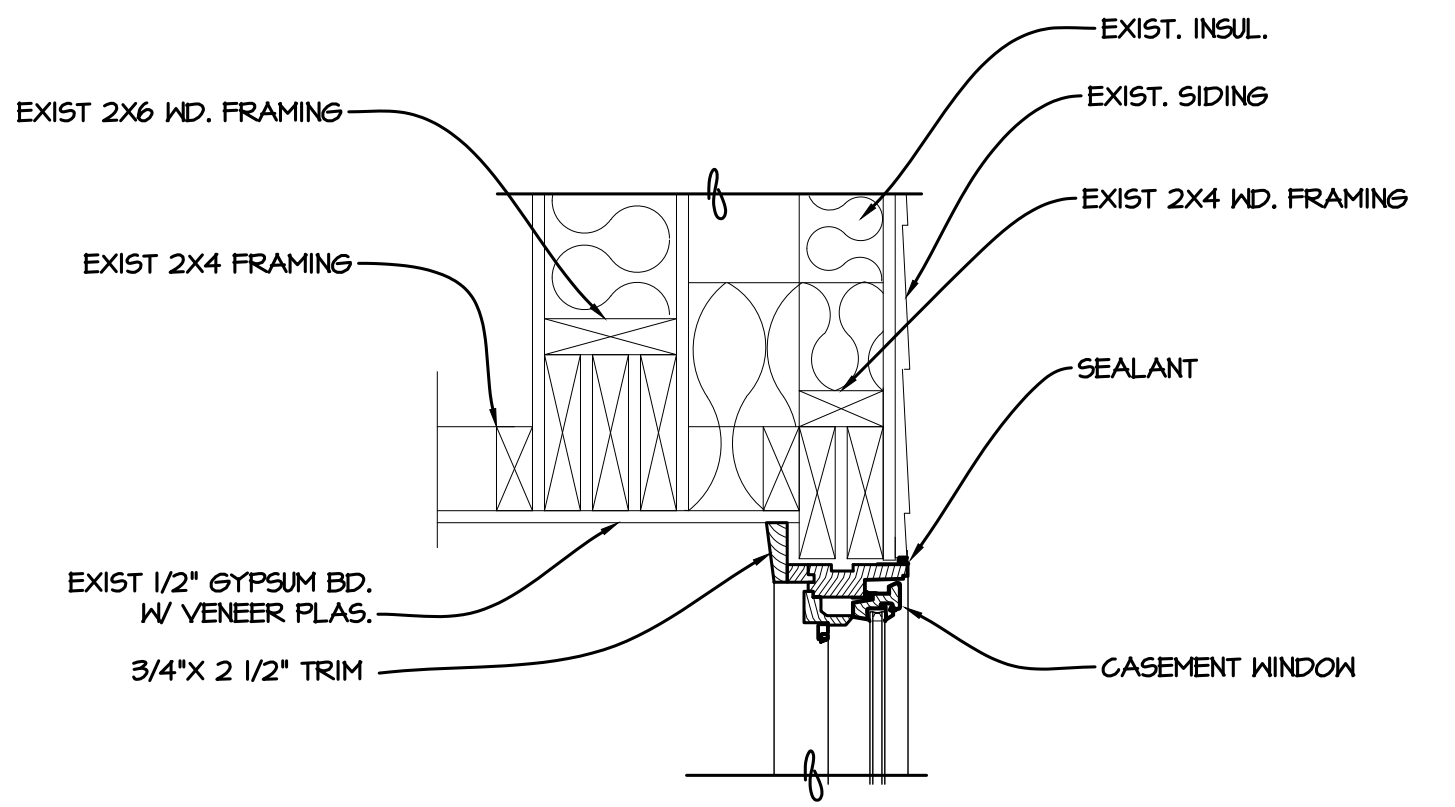
11 SILL - VINYL CLAD WINDOW
1 1/2"=1'-0"



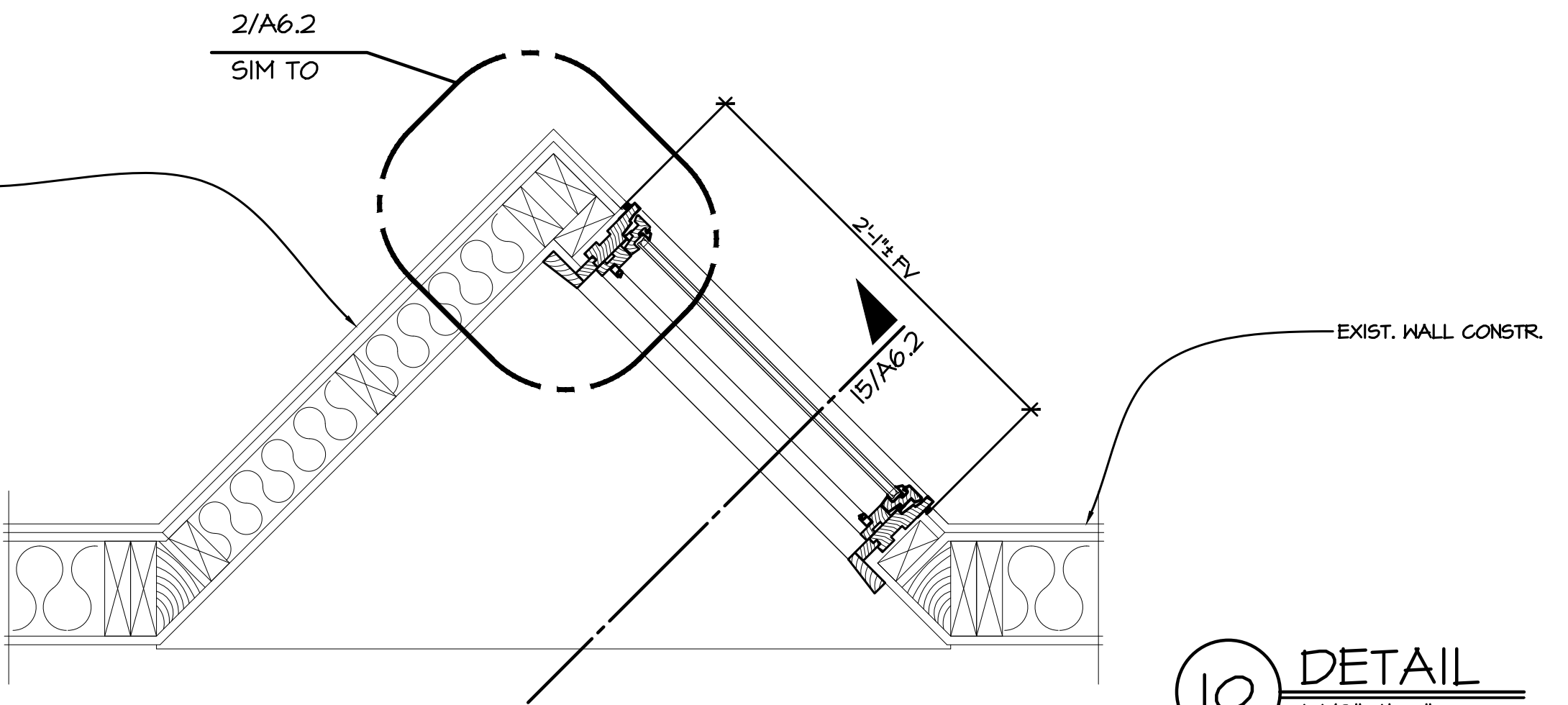
17 HEAD - HM FRAME EXT WALL
1 1/2"=1'-0"



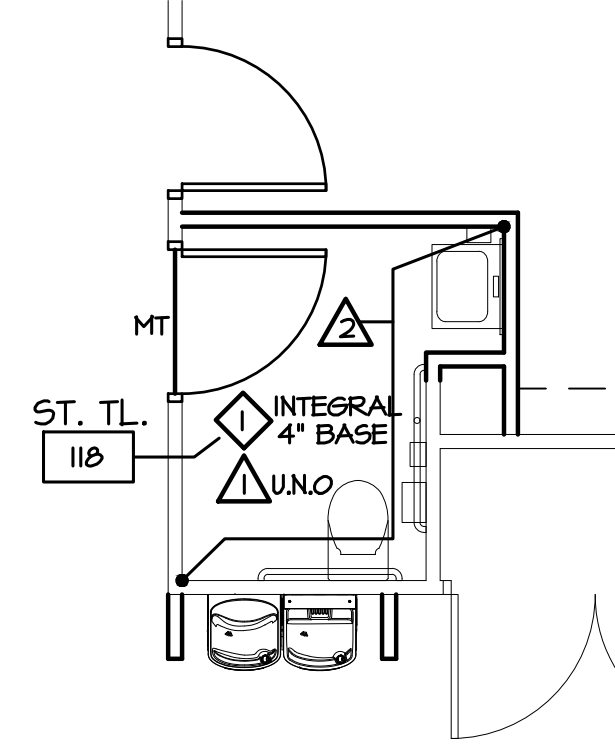
16 JAMB - HM FRAME
1 1/2"=1'-0"



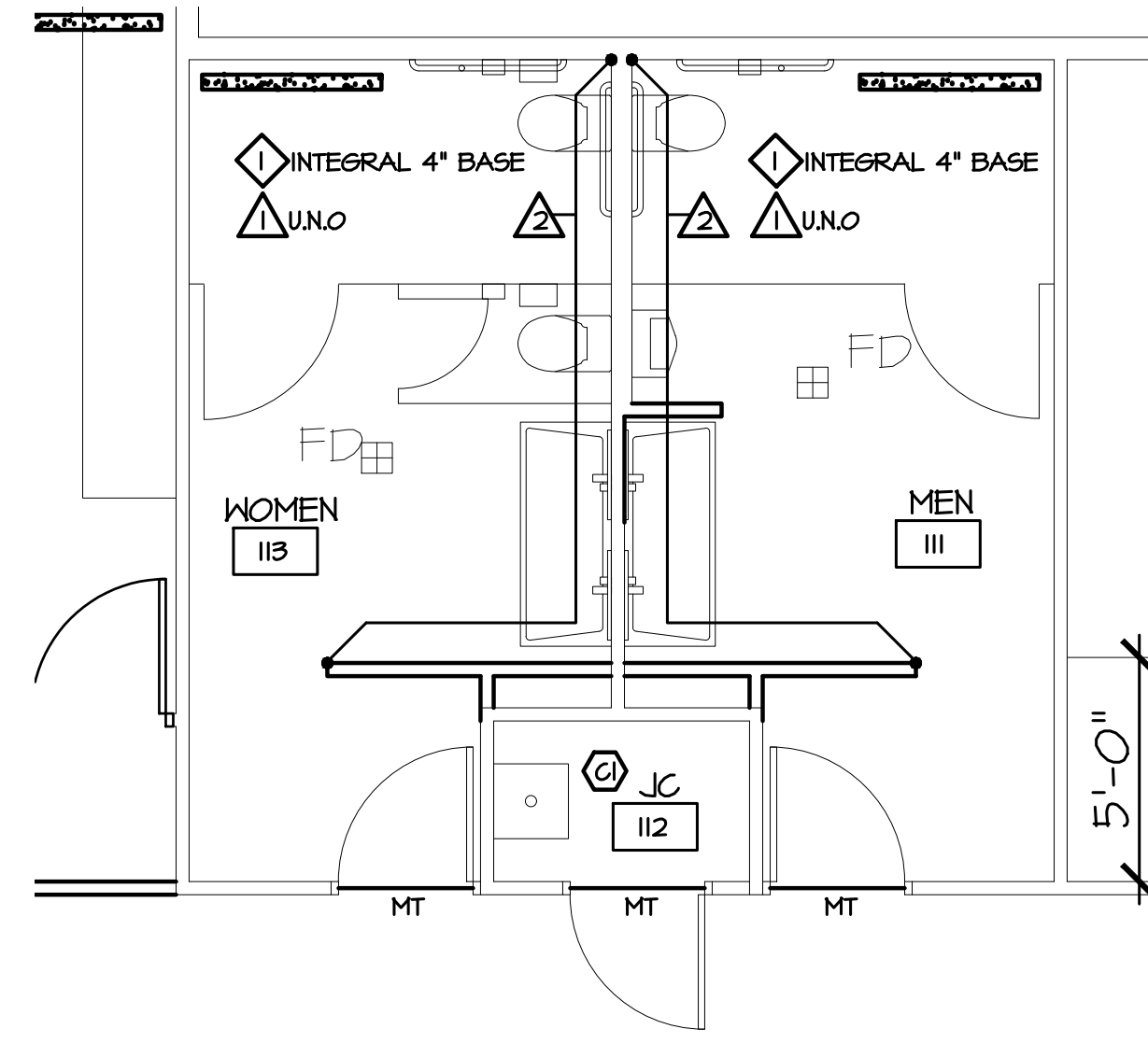
15 WINDOW DETAIL
1 1/2"=1'-0"



10 DETAIL
1 1/2"=1'-0"



3 ENLARGED COLOR PLAN - TOILET ROOM 118
SCALE: 1/4" = 1'-0"



2 ENLARGED COLOR PLAN - TOILET ROOMS 113 AND 112
SCALE: 1/4" = 1'-0"

COLOR NOTES

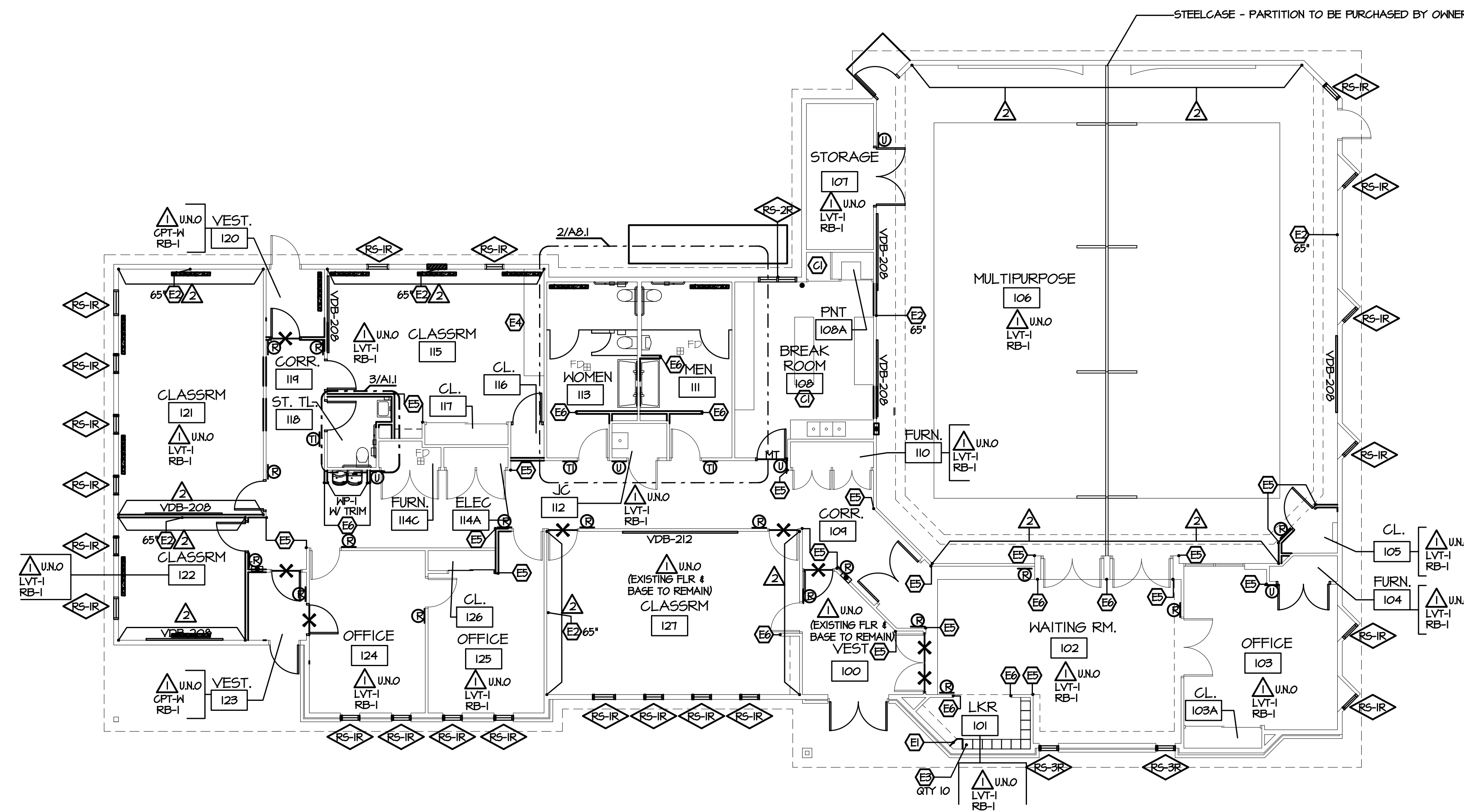
1. PAINT NEW AND EXISTING HOLLOW METAL DOORS AND FRAMES, SEMI-GLOSS, COLOR P-3, U.N.O.
2. SEE REFLECTED CEILING PLANS FOR ACOUSTICAL PANEL CEILING TYPES AND ADDITIONAL PAINT LOCATIONS.
3. PAINT ALL GYP. CEILINGS, BULKHEADS, EXPOSED, AND TEXTURED CEILINGS P-4.
4. ALL NEW CABINET HTRS SHALL BE PAINTED TO MATCH ADJACENT WALL COLOR.
5. IT IS THE RESPONSIBILITY OF ALL TRADES TO COORDINATE PREPARATION OF SURFACES TO RECEIVE FINISH PRODUCT. CONSULT WITH MANUFACTURERS RECOMMENDED PRACTICES.
6. CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH ALL OTHER DRAWINGS AND SPECIFICATIONS FOR OTHER AREAS THAT REQUIRE PATCH & REPAIR NOT INDICATED ON THESE SHEETS.
7. ANY DAMAGE TO EXISTING SURFACES TO ACCOMMODATE M.E.P. AND TECHNOLOGY SCOPE OF WORK SHALL BE REPAIRED THOUGH NOT EXPRESSLY NOTED AS "PATCH & REPAIR" IT IS INTENDED THAT THE WORK BE PERFORMED.
8. PAINT TOUCH-UP AT CEILING GRID REPLACEMENT AS REQUIRED
9. ALL NEW FLOORING SHALL BE CARRIED THROUGH ADJACENT CLOSETS.

COLOR LAY-OUT SYMBOL KEY

- ▲ PAINT (P)
- ◆ POURED RESINOUS HIGH PERFORMANCE DECOFLAKE FLR.
- LVT-# LUXURY VINYL FLOOR TILE
- MT METAL TRANSITION ACCESSORY, SEE SPEC. 096723
- RB-1 RUBBER BASE
- MATERIAL EXTENTS
- X RESILIENT TRANSITION
- WP-# WALL PROTECTION WITH TRIM

COLOR LAY-OUT KEYNOTES

- Ⓢ NO WORK



GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR METAL LOCKER SCHEDULE.
2. REFER TO SPECIFICATIONS FOR SIGNAGE DETAILS. SEE SPEC. SECTION 101400.
3. COORDINATE VISUAL DISPLAY BOARDS WITH FINAL TECHNOLOGY.
4. REFER TO SPECIFICATIONS FOR ROLLER SHADE DETAILS. SEE SPEC. SECTION 123661.6.

EQUIPMENT SYMBOL KEY

- Ⓢ ROLLER SHADES - FURNISHED AND INSTALLED BY OWNER
- V.I.F. - VERIFY IN FIELD.
- (R) INTERIOR ROOM SIGNAGE

EQUIPMENT NOTES:

- (E) FILLER TYPICAL TOP AND/OR SIDE
- (T.V.) BY OWNER. CONFIRM MOUNTING HEIGHT WITH OWNER
- (M) METAL LOCKER W/ SLOPPED TOP
- (E) EXISTING CASEWORK TO REMAIN
- (F) FULL HEIGHT PLASTIC CORNER GUARDS
- (E) FULL HEIGHT PLASTIC END WALL GUARDS

VDB SCHEDULE:

- MKBD
- VDB-208-8'-0" W X 4'-0" H MARKERBOARD
- VDB-212-12'-0" W X 4'-0" H MARKERBOARD

ROLLER SHADE SCHEDULE (RS-#):

- VERIFY ALL DIMENSIONS IN FIELD.
ALL ROLLER SHADES TO BE INSIDE MOUNT
- | TAG | TYPE | OPENESS | HAND | ARCH REF |
|-------|--------|----------------------|-------|------------|
| RS-1R | SINGLE | 3/8" LIGHT FILTERING | RIGHT | "WINDOW A" |
| RS-2R | SINGLE | 3/8" LIGHT FILTERING | RIGHT | "WINDOW C" |
| RS-3R | SINGLE | 3/8" LIGHT FILTERING | RIGHT | "WINDOW B" |

1 COLOR FINISH & EQUIPMENT PLAN
SCALE: 1/8" = 1'-0"

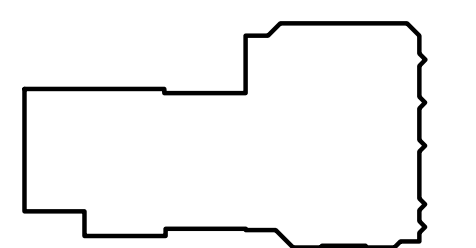


LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



REVISIONS/REVIEW DATE
CONSTRUCTION DOCUMENTS 03.22.2024

KEY PLAN



JOB NO. 2616.04 NORTH

SHEET TITLE

COLOR FINISH & EQUIPMENT PLANS
SHEET NO.

A8.1

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MECHANICAL ABBREVIATIONS table with columns for ABBREV. and DESCRIPTION. Includes items like AAV, AD, AE, AFF, APD, ASR, BAS, BFP, BHP, BMS, etc.

MECHANICAL ABBREVIATIONS table with columns for ABBREV. and DESCRIPTION. Includes items like HO, HP, HR, HTG, HYD, HZ, ID, IE, IN, INST, INV, etc.

MECHANICAL ABBREVIATIONS table with columns for ABBREV. and DESCRIPTION. Includes items like UNO, UR, VD, VTR, W, W&V, WB, WC, WG, WH, YCO.

MECHANICAL PIPING SYMBOLS table with columns for ABBREV. and DESCRIPTION. Includes symbols for pipe elbow up/down, tee, union, strainer, reducer, expansion joint, etc.

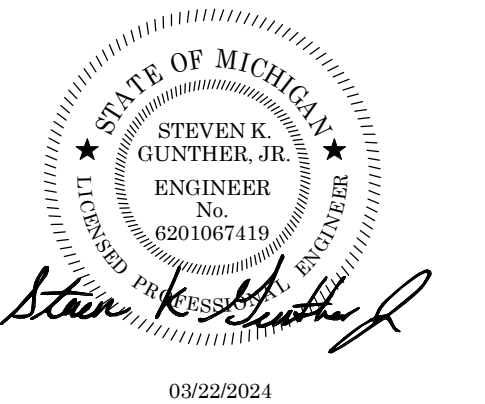
MECHANICAL SYMBOLS table with columns for ABBREV. and DESCRIPTION. Includes symbols for rectangular take-off, round take-off, spin-in fitting, elbow, radius elbow, etc.

PIPING LEGEND table with columns for ABBREV. and DESCRIPTION. Lists piping types like BCW, DI, CW, NPCW, RO, SCW, HW, HWR, NPHW, TW, F, etc.

APPLICABLE CODES AND REGULATIONS table with columns for YEAR and CODE. Lists codes like Michigan Building Code, International Fuel Gas Code, etc.

DRAWING INDEX table with columns for SHEET NO. and DESCRIPTION. Lists sheets like M0.0, PD1.1, PI.1, etc.

DRAWING NOTATION table with columns for SYMBOL and DESCRIPTION. Includes symbols for key notes, equipment designations, and connection points.



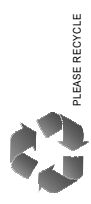
LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES table with columns for CONSTRUCTION DOCUMENTS and DATE. Shows revision 03/22/2024.

JOB NO. 2616.04
SHEET TITLE
MECHANICAL GENERAL INFORMATION
SHEET NO.
M.O.0



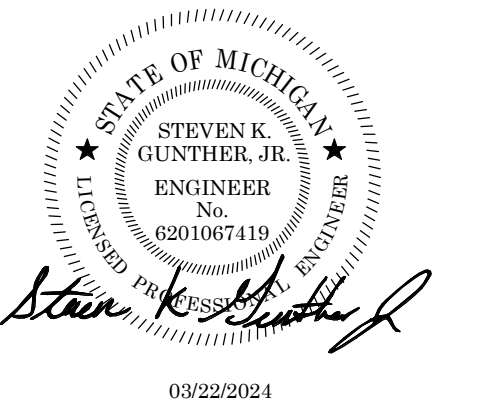


MECHANICAL DEMOLITION KEYNOTES

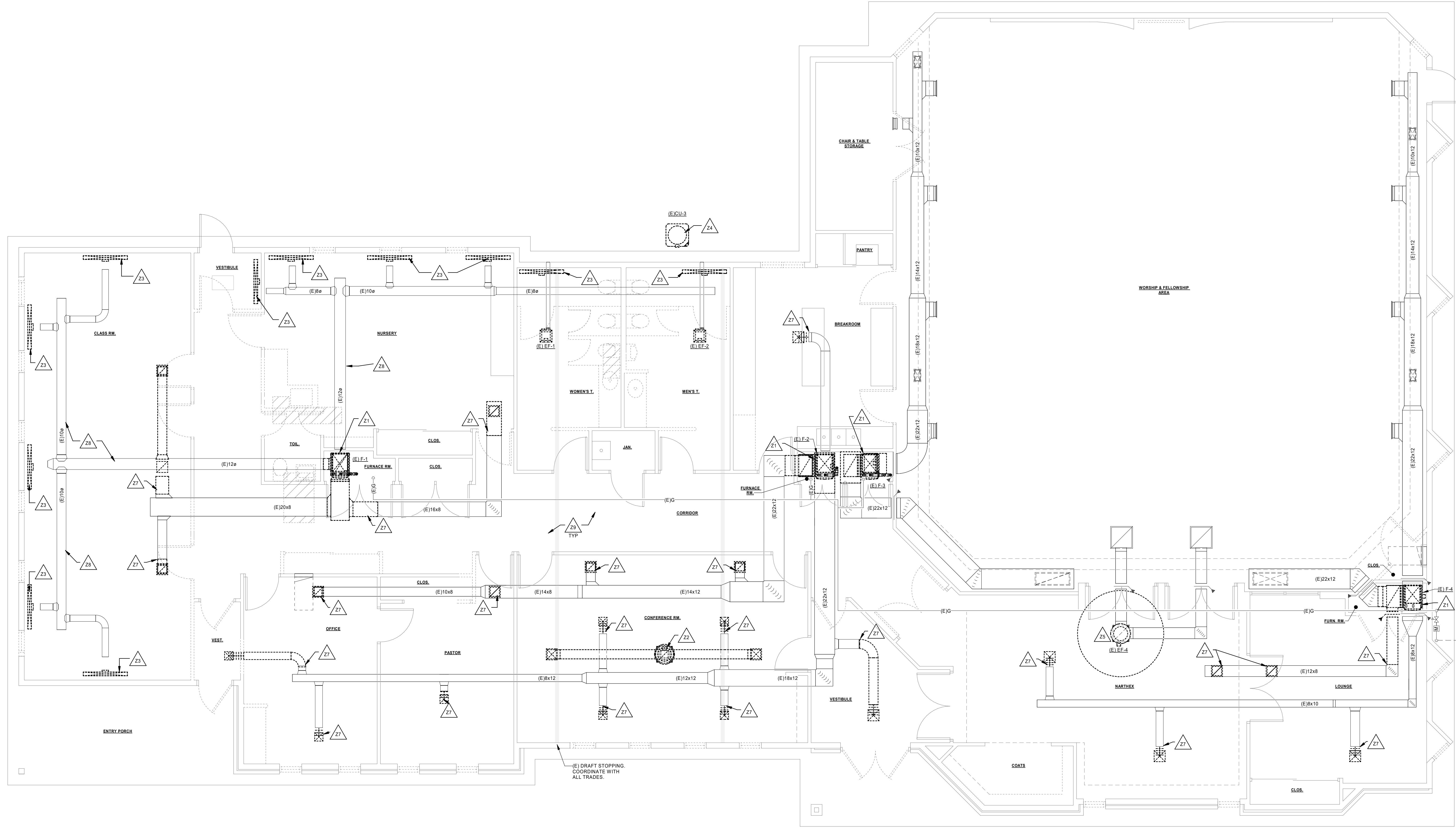
- 21 REMOVE EXISTING FURNACE COMPLETE. ALL SYSTEMS INCLUDING NATURAL GAS, DRAINAGE, FLUE AND INTAKE SHALL BE REMOVED COMPLETE. INCLUDING ALL CONNECTION AND CONNECTION SPECIALTIES, SUPPORTS, DAMPERS, CONTROLS AND VALVING. ALL DUCTWORK UP TO WALL AND FLOOR SHALL BE REMOVED AND BE PREPARED FOR RECONNECTION.
- 22 DEMOLISH EXISTING EXHAUST DUCTWORK UP THROUGH ROOF. DEMOLISH EXISTING EXHAUST FAN ON ROOF. PROVIDE CURB CAP.
- 23 DEMOLISH FLOOR MOUNTED LINEAR DIFFUSERS COMPLETE. REFER TO ARCHITECTURE FOR FLOOR INFILL. ABANDON DUCTWORK BENEATH FLOOR.
- 24 DEMOLISH EXISTING CONDENSING UNIT AND ASSOCIATED REFRIGERATION PIPING BACK TO COOLING COIL.
- 25 DEMOLISH EXISTING EXHAUST FAN AND CONTROLS COMPLETE. REMOVE CURB AND PREPARE OPENING FOR NEW RELIEF HOOD CURB.
- 27 DEMO EXISTING DUCTWORK AND DIFFUSERS AS INDICATED. WHERE APPLICABLE, PREPARE FOR NEW CONNECTION. REFER TO AND COORDINATE WITH NEW WORK PLANS.
- 28 EXISTING UNDERGROUND DUCTWORK TO BE ABANDONED IN PLACE.
- 29 EXISTING DUCTWORK IN ATTIC SPACE IS FIBERDUCT.

MECHANICAL DEMOLITION NOTES

- 1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
- 2. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY ARCHITECT OF ANY INTERFERENCES OR DISCREPANCIES.
- 3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
- 4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
- 5. ALL ITEMS ON DEMOLITION PLANS SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
- 6. ALL ITEMS INDICATED WITH BROKEN LINES SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
- 7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
- 8. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED. ALL ITEMS REMOVED SHALL BE LEGALLY DISPOSED OF. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING RELOCATED AND OWNER PROVIDED EQUIPMENT.



LANSING SCHOOL DISTRICT
 2024 District Projects
NEWCOMER CENTER REMODELING
 301 WEST JOLLY ROAD, LANSING, MI 48910



FIRST FLOOR MECHANICAL DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"



ISSUANCES	DATE
CONSTRUCTION DOCUMENTS	03/22/2024

KEY PLAN

JOB NO. 2616.04
 SHEET TITLE
FIRST FLOOR MECHANICAL DEMOLITION PLAN

SHEET NO.
MD1.1



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 SES Project # 23 0588 12

KINGSCOTT ASSOCIATES INC. KALAMAZOO, MICHIGAN

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VENTILATION SCHEDULE

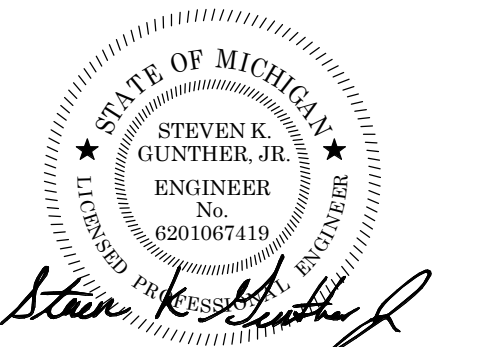
AHU	ROOM NUMBER	ROOM NAME	AREA (FT ²)	OCCUPANCY CLASSIFICATION	2016 MMC 403.3										SCHEDULED SA	SCHEDULED OA	SCHEDULED EA		
					PEOPLE RATE	AREA RATE	DENSITY #/1000	DEFAULT PEOPLE	ACTUAL PEOPLE	PEOPLE OA	AREA OA	ACH OA	FIXTURE #	PER FIXTURE EXHAUST				TOTAL EA	AIR DISTRIBUTION EFFECTIVENESS
E-1	111	MENS LOCKER RM	162	TOILET	0	0	0	0	-	0	0	0	2	50	100	1	100	140	(E) FAN
	113	WOMENS	162	TOILET	0	0	0	0	-	0	0	0	2	50	100	1	100	140	(E) FAN
	115	CLASSROOM	378	CLASSROOM (AGES 9 PLUS)	10	0.12	35	14	-	140	50	0	0	0	0	0.8	240	680	-
	120	VESTIBULE	30	CORRIDOR (VESTIBULE)	0	0	0	0	-	0	0	0	0	0	0	1	0	-	-
	121	CLASSROOM	390	CLASSROOM (AGES 9 PLUS)	10	0.12	35	14	-	140	50	0	0	0	0	0.8	240	645	-
E-2	122	CLASSROOM	195	CLASSROOM (AGES 9 PLUS)	10	0.12	35	7	-	70	25	0	0	0	0	0.8	120	380	-
	100	VESTIBULE	125	CORRIDOR (VESTIBULE)	0	0	0	0	-	0	0	0	0	0	0	1	0	-	
	108	BREAKROOM	269	BREAKROOM	5	0.06	25	7	2	10	20	0	0	0	0	0.8	40	405	-
	123	VESTIBULE	36	CORRIDOR (VESTIBULE)	0	0	0	0	-	0	0	0	0	0	0	1	0	-	
	124	OFFICE	204	OFFICE	5	0.06	2	1	-	5	15	0	0	0	0	1	20	280	-
E-3	125	OFFICE	204	OFFICE	5	0.06	2	1	-	5	15	0	0	0	0	1	20	265	-
	127	CLASSROOM	558	CLASSROOM (AGES 9 PLUS)	10	0.12	35	20	10	100	70	0	0	0	0	0.8	215	940	-
	103	MULTIPURPOSE	1223	CLASSROOM (AGES 9 PLUS)	10	0.12	35	43	26	260	150	0	0	0	0	0.8	515	185	-
	107	CLOSET	106	UNOCCUPIED STORAGE	0	0	0	0	-	0	0	0	0	0	0	1	0	1825	-
	102/101	WAITING	522	CORRIDOR (VESTIBULE)	0	0	0	0	-	0	0	0	0	0	0	1	0	330	-
E-4	103/103A	OFFICE	280	OFFICE	5	0.06	2	1	-	5	20	0	0	0	0	1	25	490	-
	106	MULTIPURPOSE	1223	CLASSROOM (AGES 9 PLUS)	10	0.12	35	43	26	260	150	0	0	0	0.8	515	1190	-	

HVAC KEYNOTES

- H1 NEW 12" OUTSIDE AIR DUCT UP THROUGH ROOF TO GOOSENECK. SEE GOOSENECK DETAIL.
- H2 PROVIDE NEW 3" INTAKE AND FLUE FROM FURNACE THROUGH ROOF. FOLLOW EXISTING OPENING IN ATTIC AND ROOF.
- H4 REBALANCE TO INDICATED CFM.
- H5 NEW 10" OUTSIDE AIR DUCT UP THROUGH ROOF TO GOOSENECK. SEE GOOSENECK DETAIL.
- H7 NEW 4" OUTSIDE AIR DUCT UP THROUGH ROOF TO GOOSENECK. SEE GOOSENECK DETAIL.
- H8 SUPPLY AND RETURN DUCTWORK TO/FROM FURNACE LOCATED IN ATTIC SPACE.
- H9 FDH LOCATED IN ATTIC SPACE.
- H10 SUPPLY AND RETURN DUCTWORK TO/FROM F-4 LOCATED BELOW TRUSSES AND ABOVE ACT CEILING.
- H11 FDH4 LOCATED BELOW TRUSSES AND ABOVE ACT CEILING.
- H12 MOUNT CONDENSING UNIT ON CONCRETE EQUIPMENT PAD, MIN 4".
- H13 ROUTE REFRIGERANT PIPING TO/FROM CONDENSING UNIT AND FURNACE. LOCATE REFRIGERANT PIPING IN ATTIC SPACE. INSTALL PER MANUFACTURER RECOMMENDATIONS. PROVIDE PIPE ENCLOSURE/COVERS FOR ANY REFRIGERANT PIPING LOCATED ON THE EXTERIOR WALL. PAINT ENCLOSURE TO MATCH ADJACENT SIDING.
- H14 ROUTE NEW 3/4" G TO NEW WATER HEATER. REFER TO NATURAL GAS RISER DIAGRAM.
- H15 PROVIDE NEW GAS CONNECTION TO FURNACE INCLUDING NEW ISOLATION VALVE, FLEXIBLE HOSE, AND DIRT LEG. REFER TO NATURAL GAS RISER DIAGRAM.
- H16 LOCATE GOOSENECK ON NORTH SIDE OF ROOF RIDGE.

HVAC GENERAL NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE HVAC SYSTEMS COMPLETE PER SPECIFICATION, SMASH STANDARDS, AND PER APPLICABLE CODES INCLUDING ALL NECESSARY OFFSETS, FITTINGS, SPECIAL RADII OR MITERED ELBOWS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR STRUCTURAL CONDITIONS OR OTHER CONDITIONS.
2. CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE WORK OF ALL OTHER TRADES. ALL DUCTWORKS TO BE ROUTED AS HIGH AS POSSIBLE. PROVIDE ACCESS AROUND ALL NEW EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY WORK.
3. DUCTWORK/PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT/PANELS. PROVIDE REQUIRED CLEARANCE IN FRONT OF ELECTRICAL EQUIPMENT. DUCTWORK/PIPING SHALL NOT INTERFERE WITH ELECTRICAL EQUIPMENT CLEARANCE.
4. DUCTWORK/PIPING SHALL NOT BE INSTALLED IN A LOCATION THAT RESTRICTS THE ACCESS TO MECHANICAL DEVICES REQUIRING ACCESS.
5. THE CONTRACTOR SHALL PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.
6. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS ETC. WITH ARCHITECTURAL TRADES. SEAL ALL PIPING AND DUCT PENETRATIONS.
7. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.
8. COORDINATE AND PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO BALANCING DAMPERS, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES. BRANCH DUCTWORK TO GRILLES, REGISTERS AND DIFFUSERS SHALL BE THE SAME SIZE AS THE GRILLE, REGISTER OR DIFFUSER NECK SIZE WHERE NO DUCT SIZE IS INDICATED ON PLAN.
9. MAXIMUM LENGTH OF FLEXIBLE DUCT SHALL BE 5'-0".
10. FOR EQUIPMENT VALVING, COMPONENT, AND PIPING ARRANGEMENT. REFER TO PIPING DIAGRAMS AND DETAILS.
11. PAINT ALL VISIBLE INTERIOR SURFACES OF EXHAUST/RETURN GRILLES, REGISTERS AND VISIBLE ASSOCIATED DUCTWORK FLAT BLACK.
12. THE CEILING SPACE IS USED AS A RETURN AIR PLENUM. NO PLASTIC MATERIALS INCLUDING PVC PIPING, CONDUIT, WIRING, ETC. SHALL BE USED. ALL MATERIAL IN THE CEILING SPACE IS TO BE PLUMBING GRADE.
13. PROVIDE CODE REQUIRED CLEARANCE/ACCESS DOORS FOR DAMPERS, VALVES, AND CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILINGS. COORDINATE LOCATIONS WITH ARCHITECT. REFER TO ARCHITECTURAL PLANS FOR CEILING TYPES.
14. DUCTWORK TO AND FROM VAV BOXES/TERMINAL UNITS SHALL BE EQUAL TO THE BOX CONNECTIONS SIZES UNLESS INDICATED OTHERWISE.
15. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. TRANSITIONS TO ALL EQUIPMENT SHALL BE VERIFIED AND PROVIDED FOR EQUIPMENT FURNISHED.
16. ALL BRANCH PIPING TO TERMINAL UNITS TO BE 3/4" UNLESS OTHERWISE NOTED.
17. ROOF MOUNTED EQUIPMENT REQUIRING SERVICE SHALL BE LOCATED A MINIMUM OF 10 FEET FROM ROOF EDGES. WHERE EQUIPMENT CAN'T BE LOCATED AWAY FROM ROOF EDGE AND GUARD RAILS ARE NOT PROVIDED, PROVIDE PERMANENT FALL ARREST ANCHORAGE CONNECTION DEVICE THAT COMPLIES WITH ANCHORAGE 2.36.1.



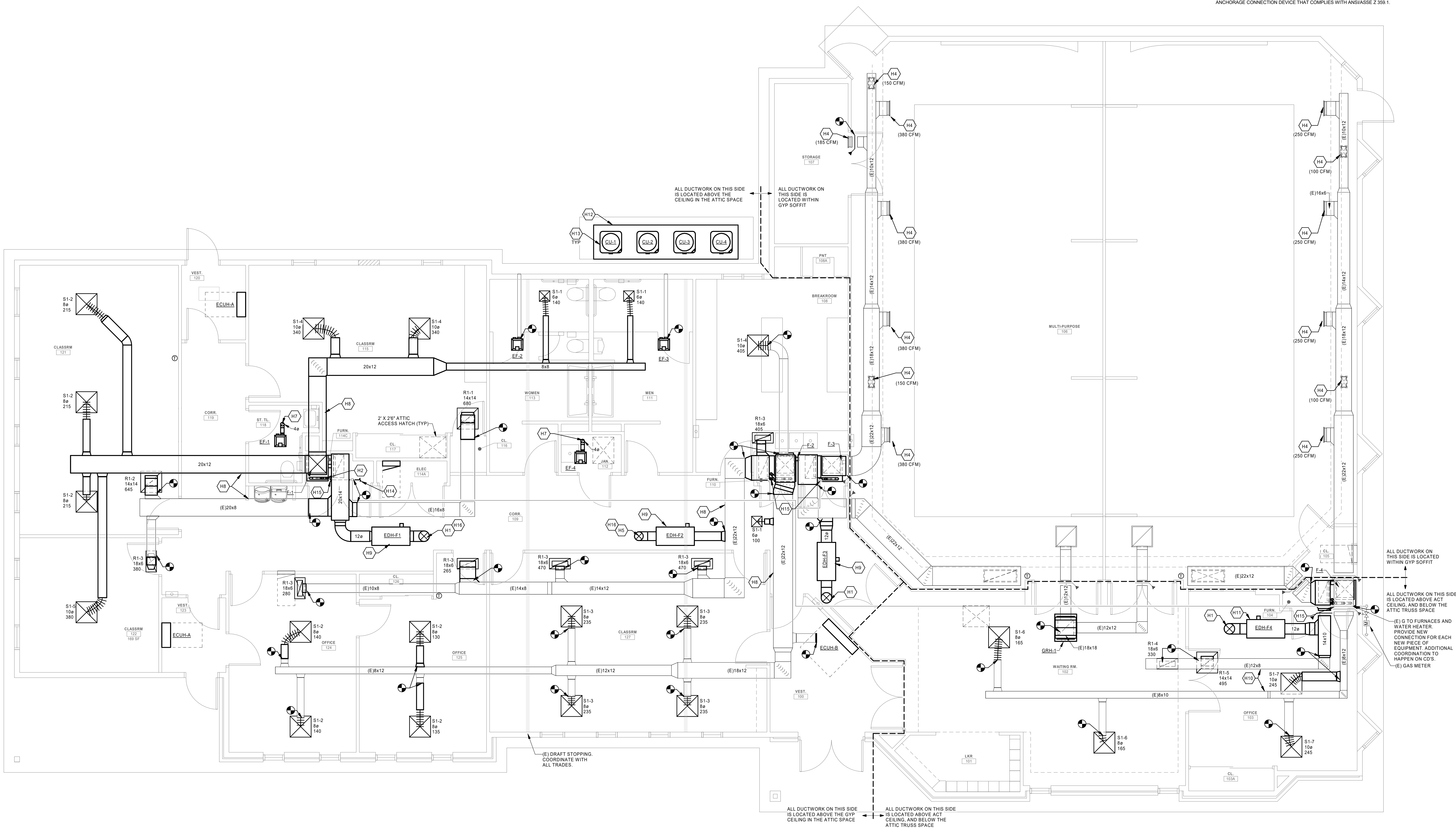
03/22/2024

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
 301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES CONSTRUCTION DOCUMENTS DATE 03/22/2024

KEY PLAN



FIRST FLOOR MECHANICAL PLAN
SCALE: 1/4" = 1'-0"

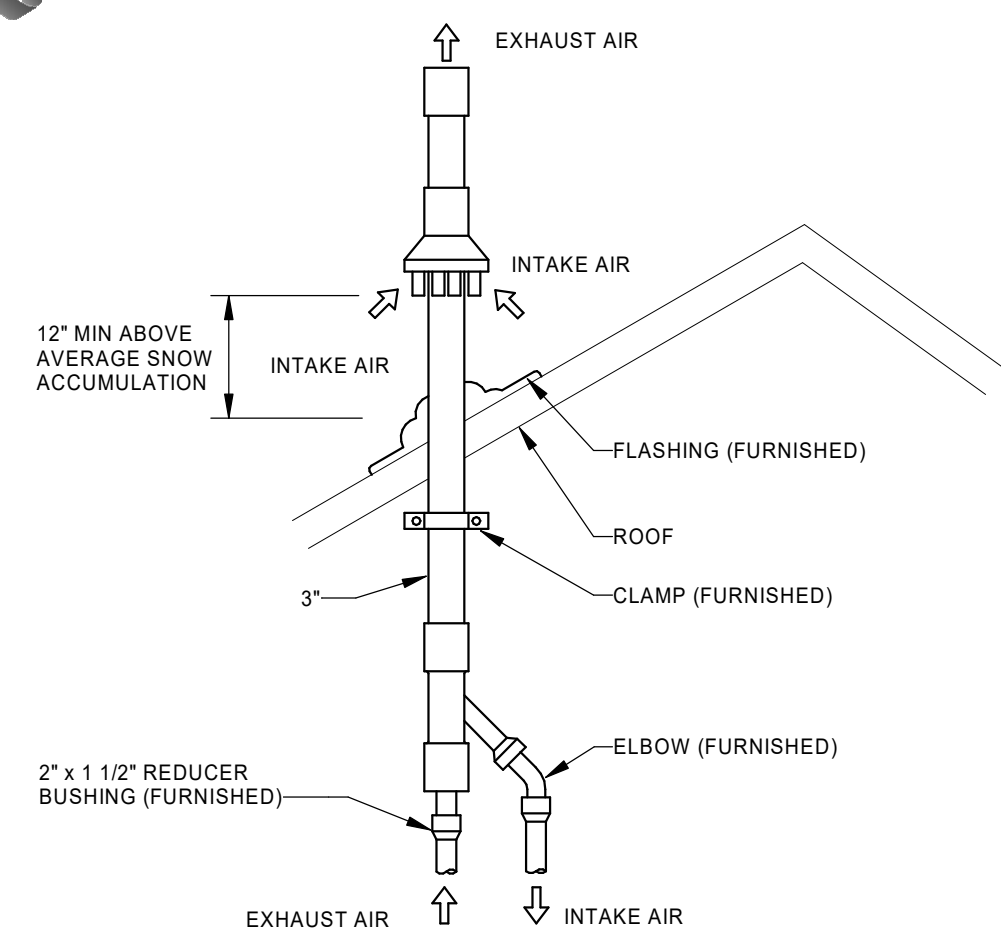
JOB NO. 2616.04 NORTH
SHEET TITLE FIRST FLOOR MECHANICAL PLAN

SHEET NO. **M1.1**

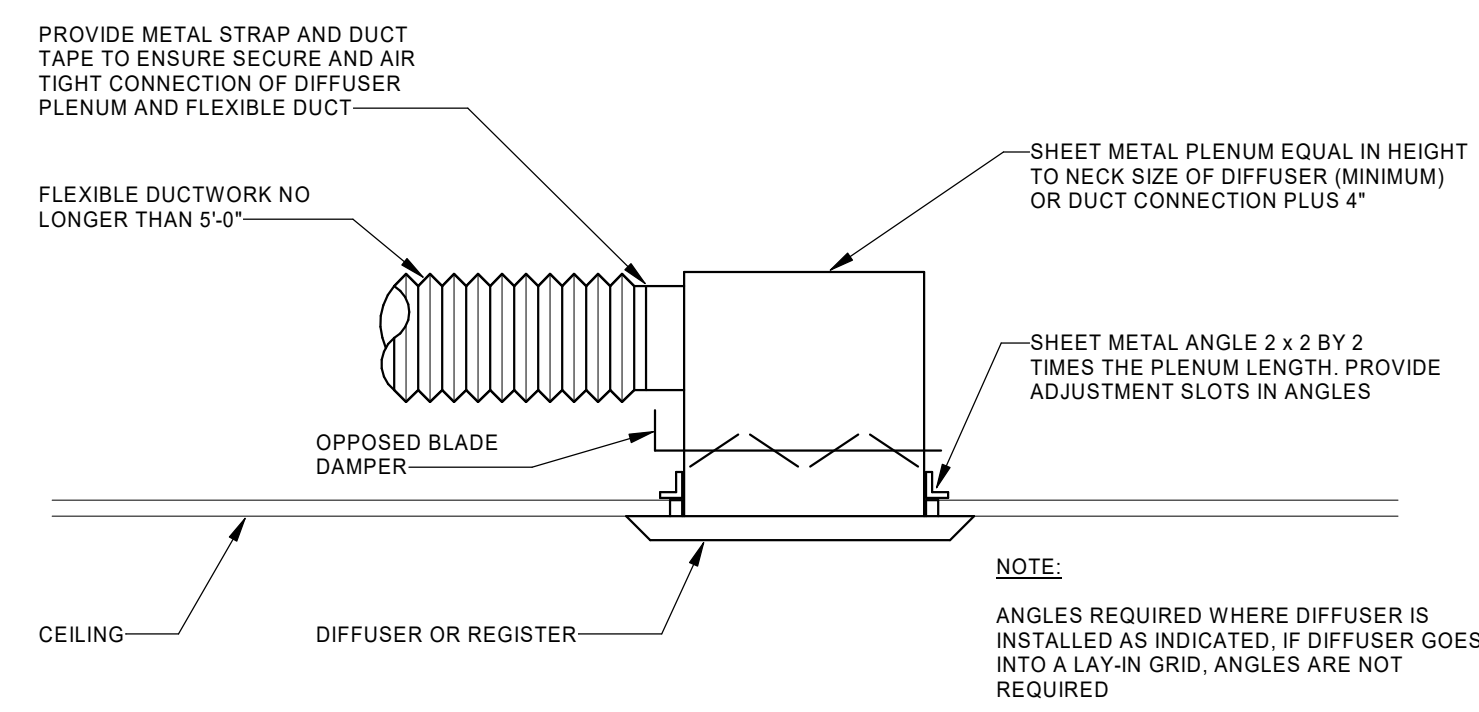


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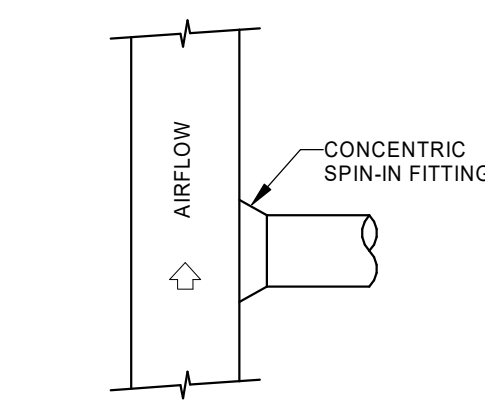
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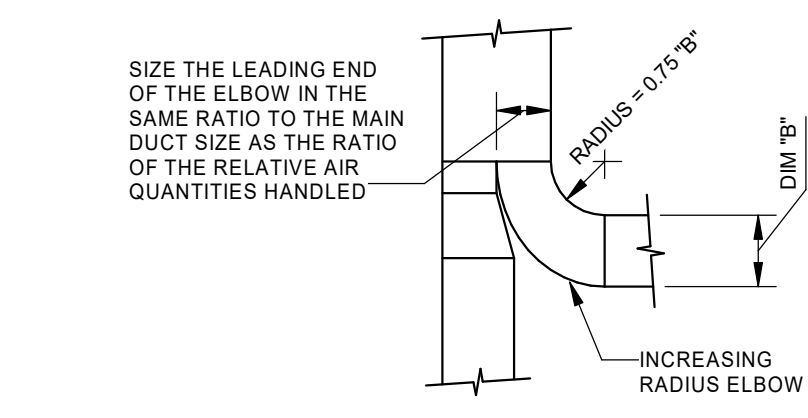
CONCENTRIC TERMINATION - SLOPED ROOF
SCALE: 1/8" = 1'-0"



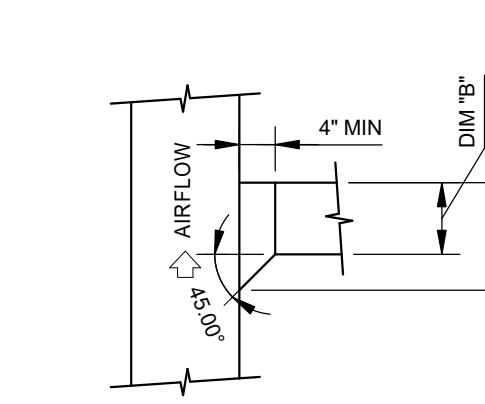
DIFFUSERS & REGISTERS HARD CEILING MOUNTING
SCALE: 1/8" = 1'-0"



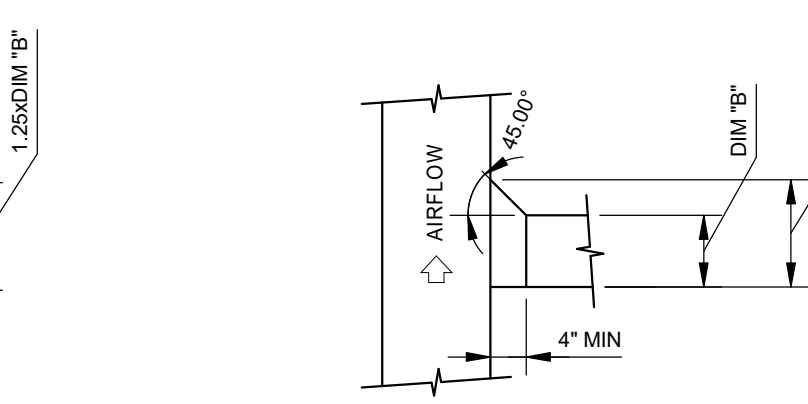
RECTANGULAR TO ROUND DUCT



SUPPLY RETURN OR EXHAUST DUCT
FOR USE WHEN A BRANCH TAKE-OFF IS TO HANDLE MORE THAN 25% OF THE AIR HANDLED BY THE MAIN DUCT

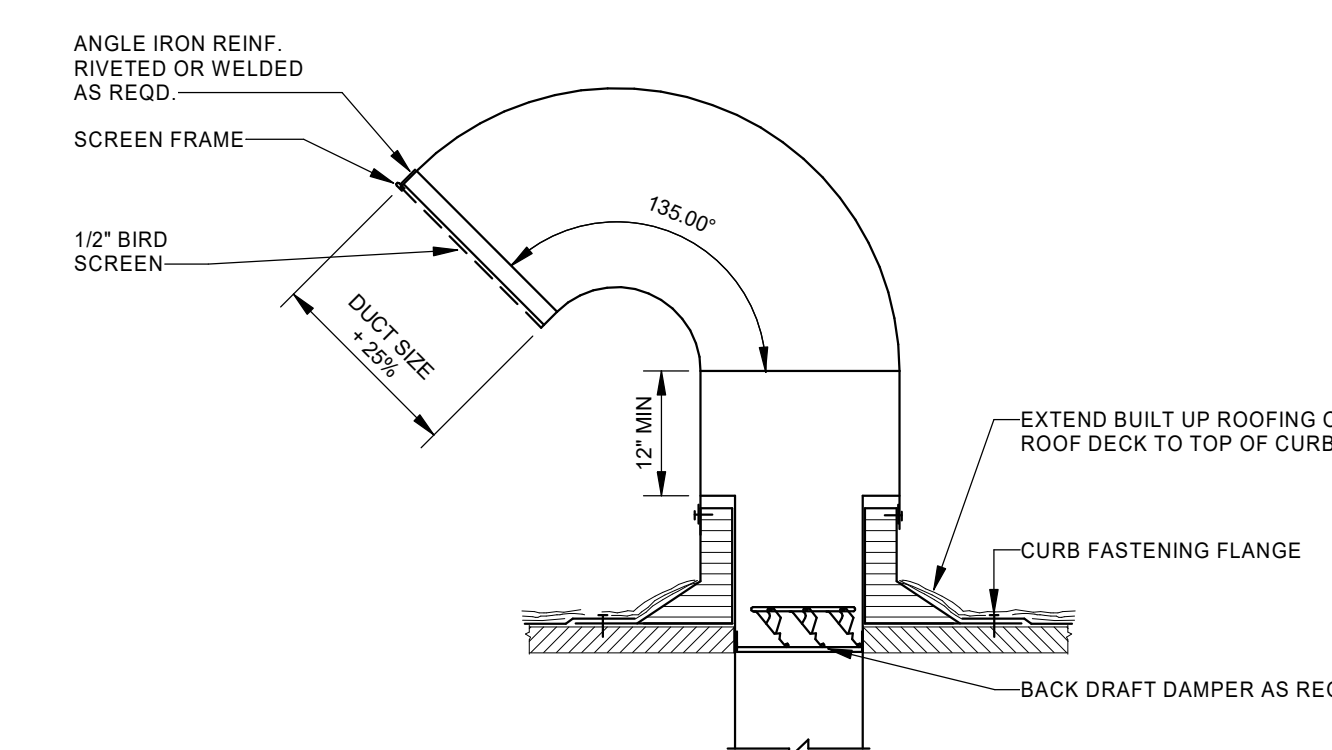


SUPPLY DUCT



RETURN OR EXHAUST DUCT

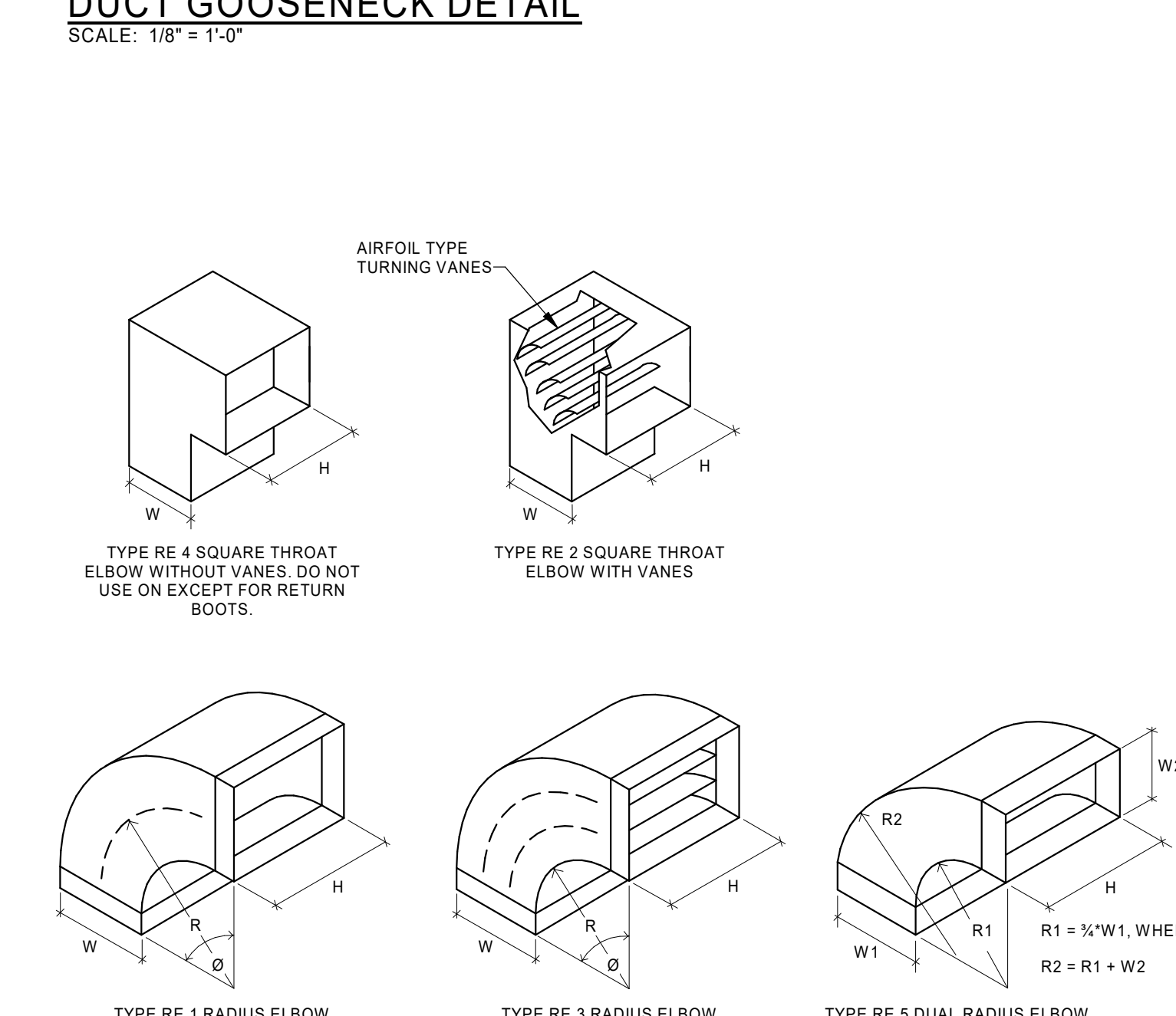
DUCT RECTANGULAR BRANCH TAKE-OFF DETAILS
SCALE: 1/8" = 1'-0"



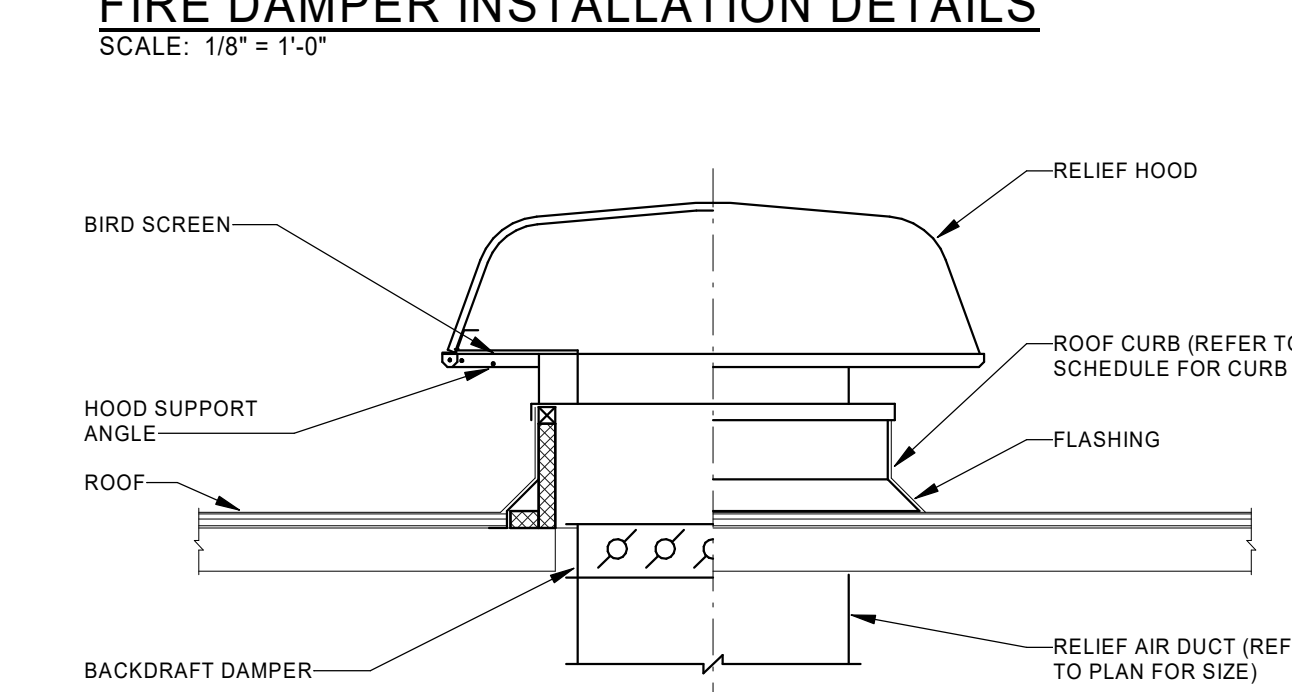
DUCT GOOSENECK DETAIL
SCALE: 1/8" = 1'-0"

- NOTES: 1. WATERPROOF ALL SEAMS AND JOINTS

DUCT RECTANGULAR SHEETMETAL ELBOWS
SCALE: 1/8" = 1'-0"

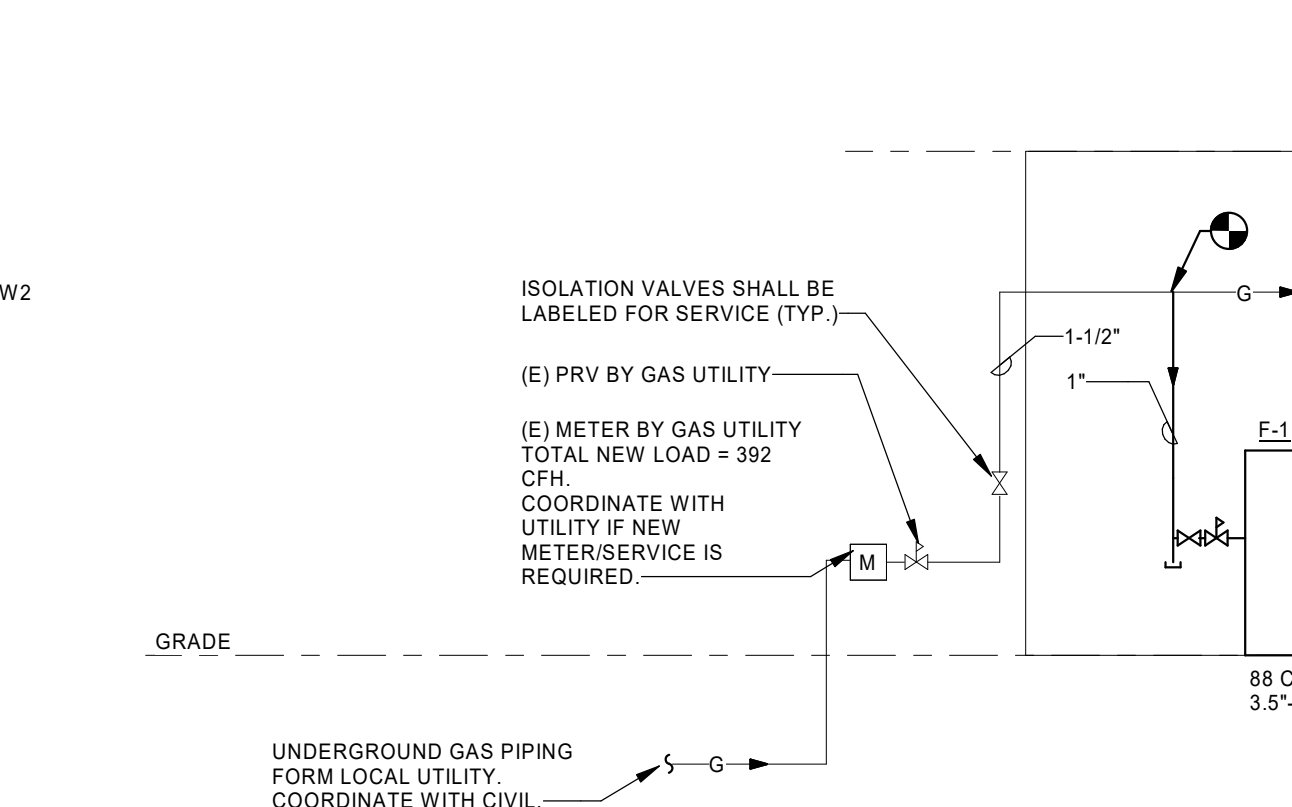


FIRE DAMPER INSTALLATION DETAILS
SCALE: 1/8" = 1'-0"



RELIEF HOOD INSTALLATION DETAIL
SCALE: 1/8" = 1'-0"

GAS FURNACE DETAIL
SCALE: 1/8" = 1'-0"



GRILLE, REGISTER AND DIFFUSER SCHEDULE table with columns for Unit ID, Type, Airflow (CFM), Face Size, Neck Size, Max Air PD, Max NC, Throw Pattern, Throw (FT), Mounting, Border, Material, Finish, Accessory, Manufacturer/Model No, and Remarks.

FURNACE SCHEDULE table with columns for Unit ID, Supply (CFM), OA (CFM), ESP (IN WG), Blower HP, Input (MBH), Output (MBH), Gas Press (IN WG), Eff APUE, Total Capacity (MBH), Sensible Capacity (MBH), Manufacturer/Model No, Associated Condensing Unit ID, Filter, MOCP, Volts, Phase, Manufacturer/Model No, and Remarks.

NOTES: 1. REFER TO ARCHITECTURAL CEILING PLAN AND COORDINATE FRAME TYPE ACCORDINGLY.

CONDENSING UNIT SCHEDULE table with columns for Unit ID, Unit Served, Nominal Tonnage, Minimum SEER, Design Ambient (F), No of Fans, No, Type, MOCP, MCA, Volts, Phase, Furn By, Inst By, Type, Manufacturer/Model No, and Remarks.

NOTES: 1. FURNACES SHALL BE PAIRED WITH MANUFACTURER CONDENSING UNIT. 2. PROVIDE WITH CONCENTRIC VENT KIT. 3. PROVIDE WITH 7-DAY PROGRAMMABLE THERMOSTATS WITH DIGITAL DISPLAY, OCCUPANCY OVERRIDE, AND SPACE TEMPERATURE DISPLAY. 4. PROVIDE AND INSTALL FILTERS AS INDICATED, IF DIFFUSER GOES INTO A LAY-IN GRID, ANGLES ARE NOT REQUIRED.

ELECTRIC TEMPERING COIL SCHEDULE table with columns for Unit ID, Service, Capacity (kW), Stages, Flow (CFM), EDB (F), LDB (F), Electrical Volts, Phase, Furn By, Inst By, Type, Manufacturer/Model No, and Remarks.

NOTES: 1. UNITS ARE PACKAGED WITH DAMPER, FAN, FAN SPEED CONTROLLER, DUCT TEMPERATURE SENSOR, WASHABLE FILTER, HEATER AND BUILT-IN ELECTRONIC CONTROLLER (SCR) AND CURRENT SENSOR. PROVIDE WITH MODULATING CONTROLLER, AIR SENSOR THAT MODULATES HEATING CAPACITY BASED ON AMOUNT OF AIR FLOWING THROUGH UNIT. 2. UNIT SHALL COME WITH THE FOLLOWING SAFETY CONTROLS: HIGH LIMIT WITH DAMPER SHUTDOWN AND ALARM, LOW LIMIT WITH DAMPER SHUTDOWN AND ALARM, HIGH TEMPERATURE RESET THERMAL CUTOFF, MANUAL RESET. UNIT SHALL BE TIED INTO ASSOCIATED FURNACE(S) VIA CURRENT SENSOR INTERLOCK. INSTALL PER MANUFACTURER REQUIREMENTS. 3. UNIT SHALL HAVE REVERSIBLE MOUNTING CAPABILITIES.

EXHAUST FAN SCHEDULE table with columns for Unit ID, Serving, Type, Airflow (CFM), ESP (IN WG), Fan (RPM), BHP, HP, RPM, Drive Type, Electrical Volts, Phase, Furn By, Inst By, Type, Curb Height (IN), Manufacturer/Model No, and Remarks.

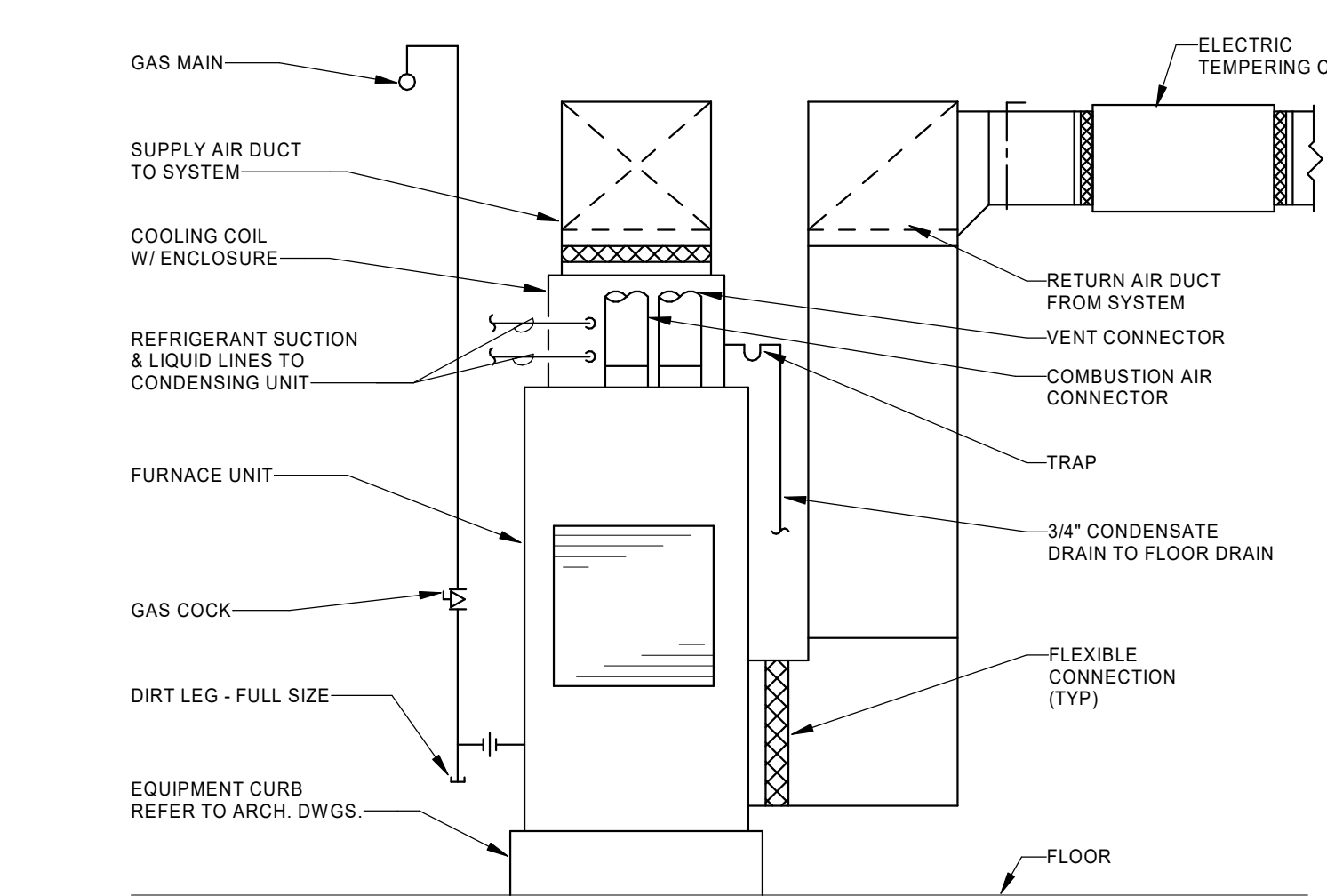
NOTES: 1. PROVIDE WITH GRILLE MOUNTED MOTION DETECTOR WITH TIME DELAY. 2. PROVIDE WITH MOUNTED CEILING RADIATION DAMPER. 3. FAN TO OPERATE CONTINUOUSLY.

INTAKE/RELIEF HOOD SCHEDULE table with columns for Unit ID, System Served, Airflow (CFM), Throat Size (IN), Throat Velocity (FPM), Static Pressure Drop (IN WG), Width (IN), Length (IN), Height (IN), Curb Height (IN), Hood Construction, Manufacturer/Model No, and Remarks.

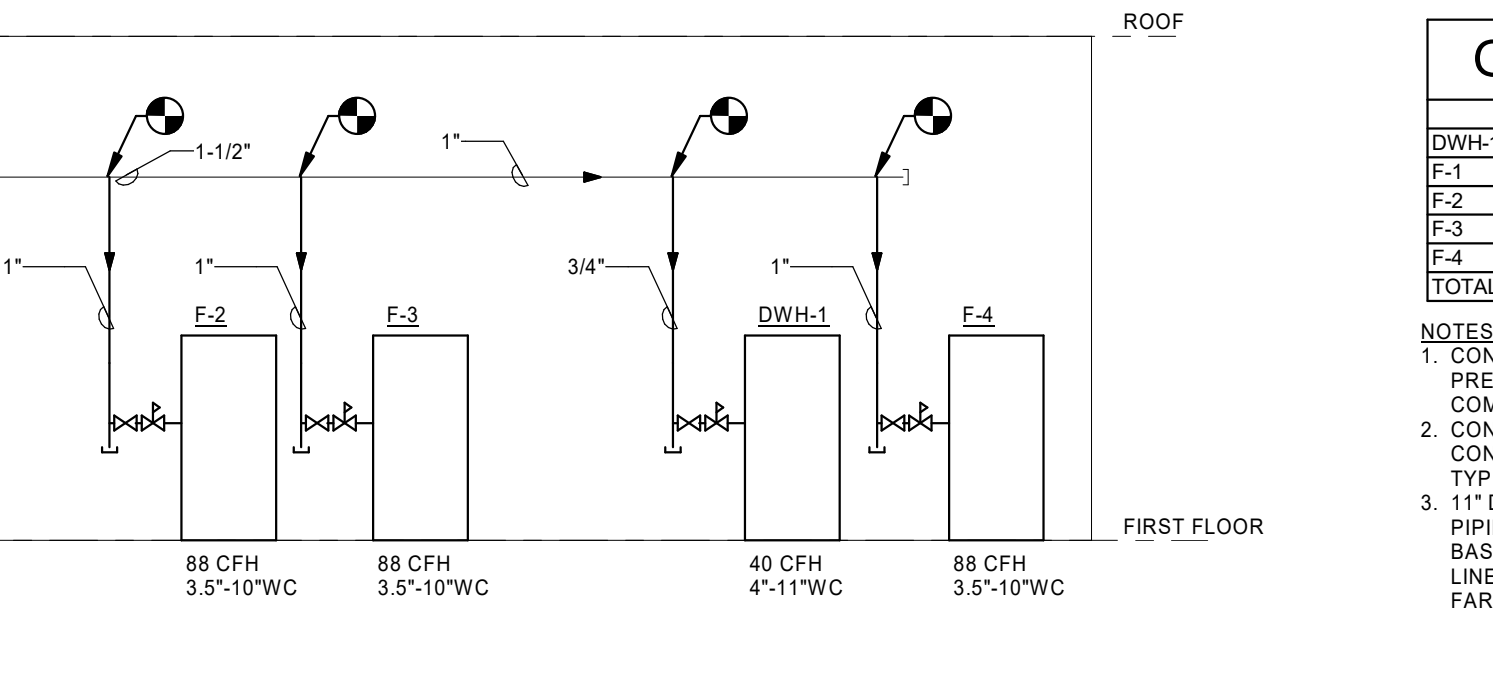
NOTES: 1. PROVIDE INSECT SCREEN AND GALVANIZED BIRDSCREEN. 2. PROVIDE BACKDRAFT DAMPER.

ELECTRIC HEATER SCHEDULE table with columns for Unit ID, MBH, kW, CFM, Volts, Phase, Length, Width, Height, Mounting, Manufacturer/Model No, and Remarks.

NOTES: 1. MANUFACTURER TO PROVIDE BUILT-IN CONTROLS AND FACTORY MOUNTED DISCONNECT. (IF REMOTE THERMOSTAT IS SHOWN ON DRAWINGS, PROVIDE REMOTE THERMOSTAT).



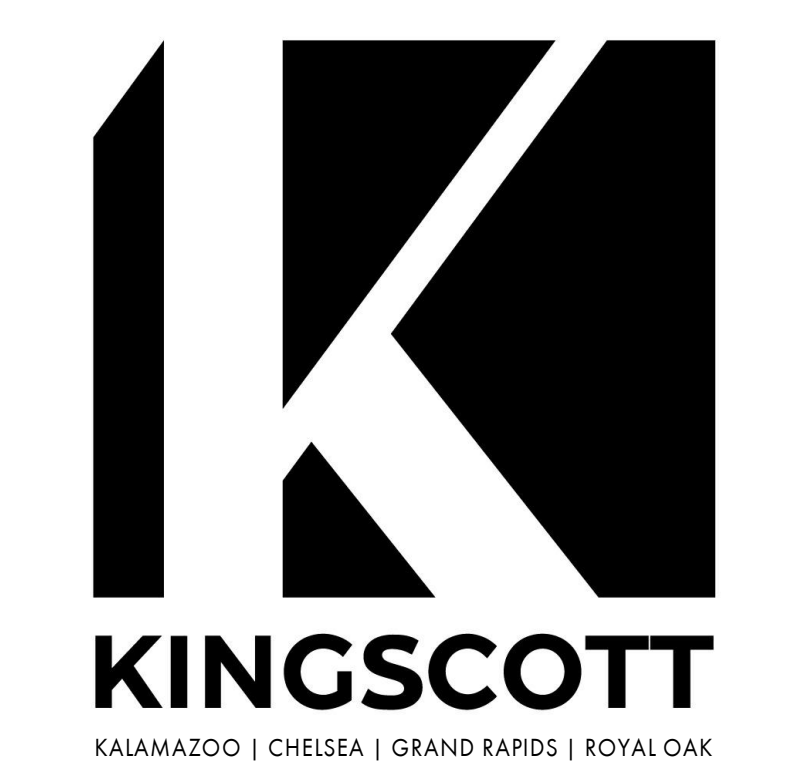
GAS FURNACE DETAIL
SCALE: 1/8" = 1'-0"



NATURAL GAS RISER DIAGRAM
NO SCALE

GAS LOAD SUMMARY table with columns for Equipment ID, CFH, and Total CFH.

NOTES: 1. CONTRACTOR TO COORDINATE GAS LOAD AND PRESSURE REQUIREMENTS WITH LOCAL UTILITY COMPANY. 2. CONTRACTOR SHALL VERIFY ALL EQUIPMENT CONNECTION REQUIREMENTS (SIZES, LOCATION, TYPES, ETC.) PRIOR TO COMMENCEMENT OF WORK. 3. 1" DELIVERY PRESSURE DISTRIBUTION OF GAS PIPING IS SIZED FOR A 0.5" W.C. PRESSURE DROP. BASED ON A TOTAL DEVELOPED LENGTH OF 175 LINEAR FEET SCHEDULE 40 METALLIC PIPE TO FARTHEST EQUIPMENT.



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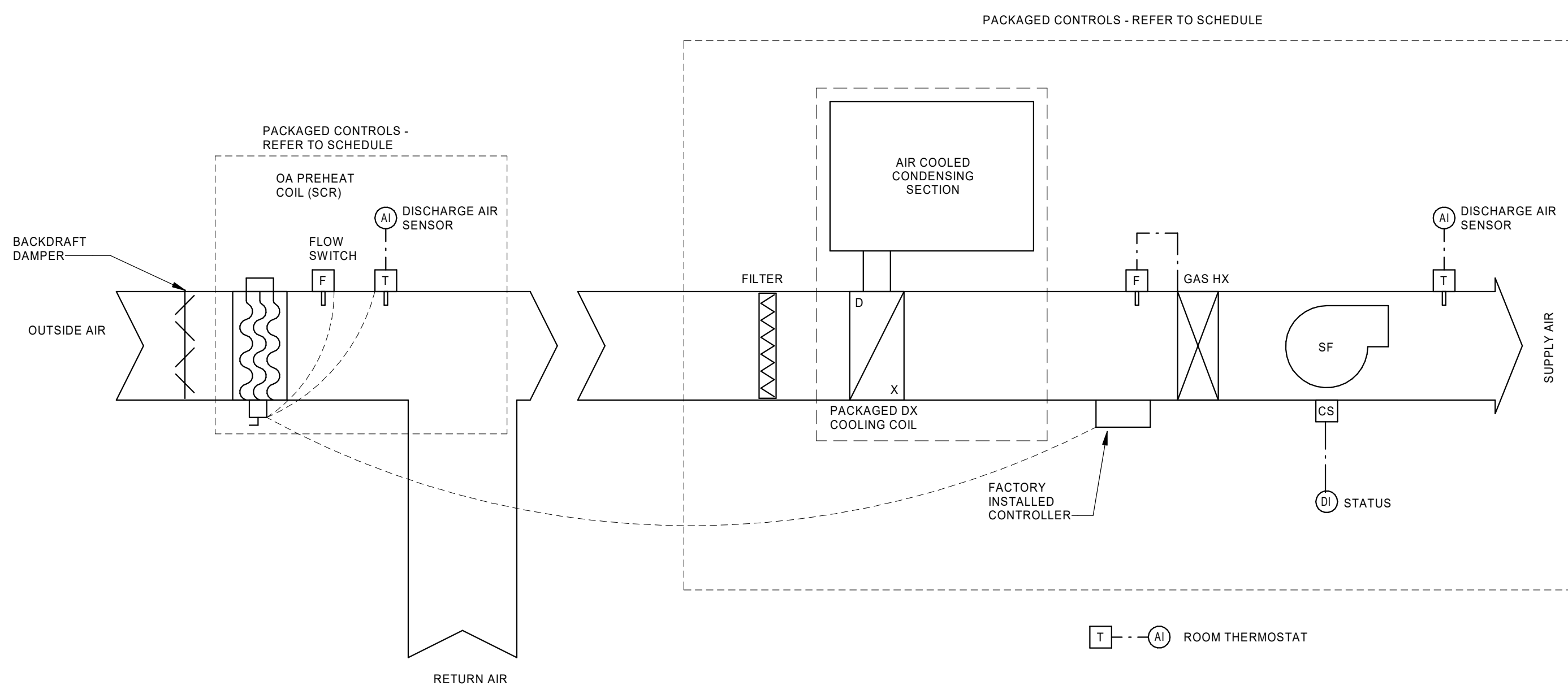
Table with columns for ISSUANCES, CONSTRUCTION DOCUMENTS, DATE, and SHEET NO.

SES Strategic Energy Solutions logo and contact information: 4000 W. Eleven Mile Road, Berkley, MI 48072. Phone: 248.399.1900, Fax: 248.399.1901. Website: www.sesnet.com. Copyright © 2023 SES, INC. SES Project # 23 0588 12.

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	SENSOR PROBE	(A) ANALOG INPUT
	DISCONNECT SWITCH	(AO) ANALOG OUTPUT
	AVERAGING SENSOR	(DI) DIGITAL INPUT
	DISPERSION TUBE	(DO) DIGITAL OUTPUT
	CARBON DIOXIDE STAT	(VP) VIRTUAL POINT
	PARALLEL BLADE DAMPER	(CD) CARBON DIOXIDE STAT
	OPPOSED BLADE DAMPER	(H) HUMIDISTAT
	BACKFLOW DAMPER	(T) THERMOSTAT
	FLOW MEASURING STATION	(CS) CARBON DIOXIDE SENSOR
	BUILDING PRESSURE SENSOR	(CM) CARBON MONOXIDE SENSOR
	CHILLED WATER COIL	(HS) HUMIDITY SENSOR
	DX COIL	(NOX) NOX SENSOR
	ELECTRIC HEATING ELEMENT	(OS) OCCUPANCY SENSOR
	GAS HEATING COIL	(T) TEMPERATURE SENSOR
	HEATING HOT WATER COIL	(ECM) ELECTRONIC COMMUTATED MOTOR
	ENERGY RECOVERY WHEEL	(M) MOTOR STARTER
	FAN	(S) START STOP
	PLENUM FAN	(V) VARIABLE FREQUENCY DRIVE
	PROP FAN	(BI) BIPOLAR IONIZATION
	PUMP	(C) CURRENT SENSOR
	FILTER	(CFM) CFM SENSOR
	SINGLE FILTER WITH DIFFERENTIAL PRESSURE TRANSMITTER	(CM) CONTROL MODULE
	DOUBLE FILTER WITH DIFFERENTIAL PRESSURE TRANSMITTER	(CS) CURRENT SWITCH



SEQUENCE OF OPERATIONS:

GENERAL:

THE FURNACE SHALL BE A PACKAGED UNIT OPERATING UNDER PACKAGED CONTROLS TO MAINTAIN ROOM SET POINT. THE PREHEAT COIL SHALL OPERATE WITH PACKAGED CONTROLS TO MAINTAIN DISCHARGE TEMPERATURE OF 32°F. THE TEMPERATURE CONTROLS CONTRACTOR SHALL ENSURE THE FURNACE/FAN STATUS (ON/OFF), DISCHARGE TEMPERATURE, ROOM SETPOINT AND TEMPERATURE ARE RELAYED BACK TO THE BMS FOR REMOTE VIEWING.

THE FURNACE SHALL BE ENABLED / DISABLED DURING OCCUPIED / UNOCCUPIED PERIODS BY THE BUILDING MANAGEMENT SYSTEM (BMS) ACCORDING TO THE MENU DRIVEN, WEEKLY SCHEDULING PROGRAM WHEN THE UNIT IS IN THE AUTO POSITION. THE UNIT SHALL BE KEPT IN AUTO POSITION. HAND AND OFF SHALL BE USED ONLY DURING MAINTENANCE. PRELIMINARY OCCUPANCY SHALL BE AS FOLLOWS:

OCCUPIED: 6AM - 8PM (ADJ.)
UNOCCUPIED: 8PM - 6AM (ADJ.)

OCCUPIED SET-POINTS SHALL BE AS FOLLOWS:
COOLING: 75°F (ADJ) WITH A 5°F DEADBAND
HEATING: 70°F (ADJ) WITH A 7°F DEADBAND
UNOCCUPIED SET-POINTS SHALL BE AS FOLLOWS:
COOLING: 80°F (ADJ) WITH A 20°F DEADBAND
HEATING: 80°F (ADJ) WITH A 20°F DEADBAND

THE UNIT SHALL AUTOMATICALLY TURN OFF DURING UNOCCUPIED MODE.

DURING UNOCCUPIED MODE, THE PACKAGED CONTROLLER SHALL CONTINUOUSLY POLL SPACE TEMPERATURE SENSORS IN THE SPACES. IF SPACE TEMPERATURE SENSOR IS OUTSIDE OF THE ALLOWABLE DEADBAND TEMPERATURE RANGE, THE SUPPLY FAN SHALL BE COMMANDED TO START, AND THE UNIT SHALL FOLLOW SEQUENCE TO MAINTAIN SPACE TEMPERATURE.

ALL SET-POINTS, TIME INTERVALS, AND OCCUPANCY SCHEDULES SHALL BE ADJUSTABLE BY THE SYSTEM OPERATOR.

SUPPLY FAN SPEED AND TEMPERATURE CONTROL

THE SUPPLY FAN SHALL OPERATE AT CONSTANT AIRFLOW DURING OCCUPIED TIMES WHILE MAINTAINING MINIMUM OA CFM.

UPON A RISE IN SPACE AIR TEMPERATURE FOR A TIME PERIOD OF 60 SECONDS (ADJ.), THE CONDENSING SECTION SHALL CYCLE ON/OFF AND STAGE/MODULATE COMPRESSORS AS REQUIRED ALONG WITH THE SUPPLY FAN SPEED TO MAINTAIN SPACE TEMPERATURE SETPOINT.

UPON A DROP IN SPACE TEMPERATURE, THE GAS HEATER SHALL BE ENABLED TO MEET SPACE TEMPERATURE REQUIREMENT. IF THE SPACE TEMPERATURE CONTINUES TO REQUIRE ADDITIONAL HEATING, THE GAS HEATER SHALL RAMP UP TO MEET SPACE TEMPERATURE.

WHEN NO ADDITIONAL HEATING IS REQUIRED, THE UNIT SHALL DISABLE GAS HEATER.

OA PREHEAT COIL

THE ELECTRIC PREHEAT COIL SHALL BE ENABLED AND MODULATE TO MAINTAIN THE MIN. REQUIRED FURNACE ENTERING AIR TEMPERATURE, AS DETERMINED BY THE MANUFACTURER TO PREVENT ANY DAMAGE TO THE FURNACE. INITIAL SETPOINT OF 55°F (ADJ.)

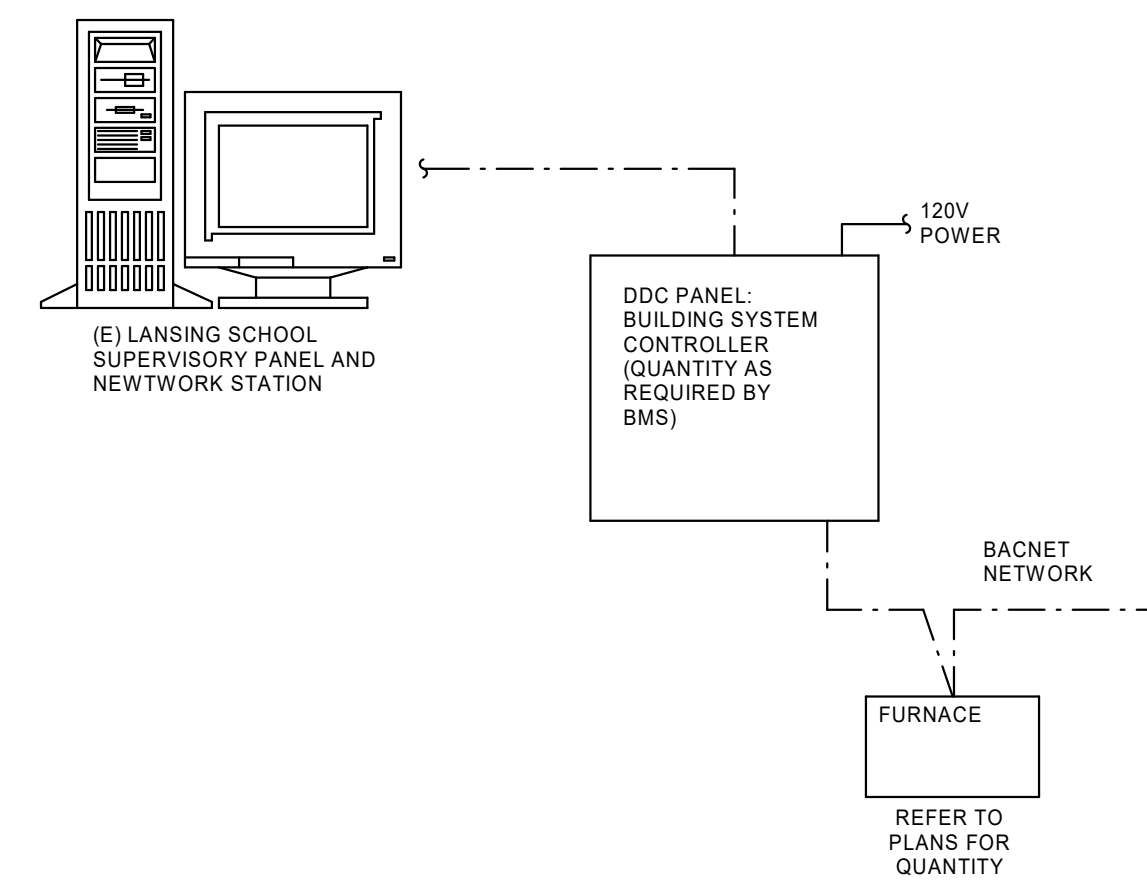
SAFETIES AND ALARMS:

CURRENT SENSING RELAYS SHALL BE USED TO MONITOR THE STATUS OF THE FANS. IF THE STATUS INDICATED DOES NOT MATCH THE COMMANDED OUTPUT, AN ALARM SHALL BE GENERATED AT THE PACKAGED CONTROLLER.

IF NO FLOW IS DETECTED AT THE GAS FIRED HEAT EXCHANGER FLOW SWITCH, THE SUPPLY FAN SHALL BE STOPPED, AND AN ALARM SHALL BE GENERATED.

IF SUFFICIENT AIRFLOW IS NOT PRESENT AT THE ELECTRIC PREHEATING COIL, THE COIL SHALL NOT OPERATE, AND AN ALARM SHALL BE GENERATED.

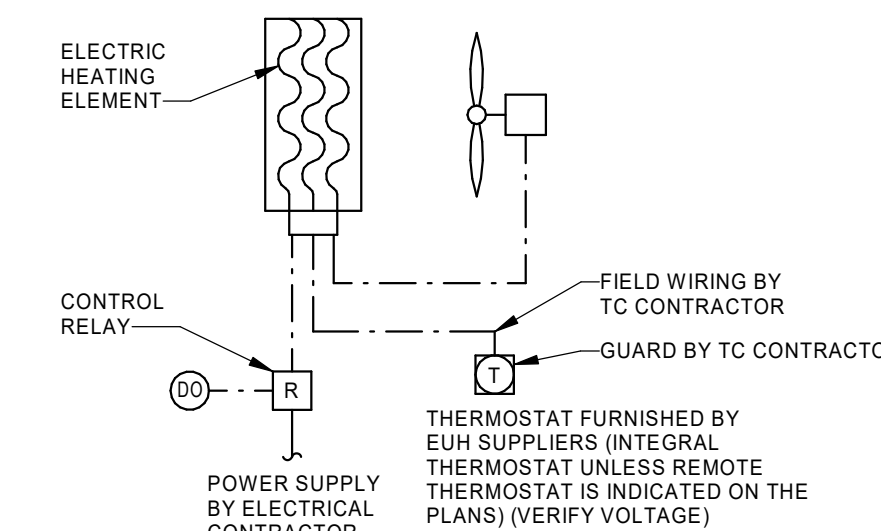
FURNACE CONTROLS DIAGRAM
NO SCALE



BUILDING MANAGEMENT SYSTEM (BMS) NOTES:

- CONTROLS SHALL BE PROVIDED BY SC TECH UNLESS OTHERWISE INDICATED BY LANSING PUBLIC SCHOOLS.
- THE INTENT IS TO PROVIDE A FULLY FUNCTIONING AND COMPLETE BUILDING MANAGEMENT SYSTEMS (BAS OR BMS) WITH REMOTE/INTERNET ACCESS, GRAPHICAL READOUTS, TREAD DATA, SWEETIES, ALARMS, AND THE LIKE.
- CONFIGURATION AND ORDER OF CONTROLLER CONNECTION IS FOR REPRESENTATION PURPOSES ONLY. CONTROL SYSTEM DRAWINGS SHALL REFLECT ACTUAL AS-BUILT CONDITIONS, INCLUDING ORDER IN WHICH CONTROLLERS ARE CONNECTED WITHIN THE NETWORK. DDC PANELS ARE SHOWN ON FLOOR PLANS (IN THE MECHANICAL/ELECTRICAL ROOM, STORAGE ROOMS, CUSTODIAL CLOSETS, ETC.) THROUGHOUT THE BUILDING SHALL HAVE 120V CONTROL POWER AT EACH. REFER TO PLANS. IF ADDITIONAL DDC PANELS AND/OR POWER SUPPLIES ARE REQUIRED, IT IS THE TCCS RESPONSIBILITY TO PROVIDE POWER TO THOSE PANELS AND COORDINATE WITH THE ELECTRICAL ENGINEER/CONTRACTOR. IT SHOULD BE NOTED THAT ADDITIONAL ELEMENTS SUCH AS GENERAL VALVES, OTHER NON-ACTIVELY CONTROLLED DEVICES, AND/OR OTHER NETWORK COMMUNICATION DEVICES (SUCH AS CONTACTORS, RELAYS, SWITCHES, HUBS, ROUTERS, ETC.) MAY NOT BE SHOWN ON CONTROLS DRAWINGS. REFER TO THE DETAILS, PROJECT PLANS, AND SPECIFICATIONS FOR ADDITIONAL DEVICES AND INSTRUCTIONS THAT ARE REQUIRED IN THE CONSTRUCTION OF THESE SYSTEMS.
- ALL CONTROL POINTS SHALL BE TRENDBLE. AFTER THE SYSTEM IS BALANCED, COMMISSIONED, AND OPERATIONAL, TRENDBLING WILL BE REQUIRED TO VERIFY THE ACCURACY AND ACCEPTABILITY OF THE CONTROL SEQUENCES. PROVIDE ADDITIONAL ADJUSTMENTS AND/OR CHANGES IN STRATEGY IN ORDER TO HONE BUILDING OPERATION AND OPTIMIZE ENERGY USAGE. ALL SET POINTS SHALL BE OPERATOR ADJUSTABLE THROUGH THE BMS AT THE OPERATOR'S WORKSTATION (OWS).
- PROVIDE PROGRAMMING FOR ADDITIONAL ALARMS AS REQUESTED BY THE OWNER AND/OR ENGINEER.
- SEE FLOOR PLANS, SPECIFICATIONS, AND SHOP DRAWINGS FOR MINIMUM CLEARANCE OF ALL MECHANICAL EQUIPMENT AND CONTROL DEVICES. MAINTAIN ACCEPTABLE CLEARANCE IN ALL AREAS REQUIRED FOR SERVICE AND ACCESS OF MECHANICAL EQUIPMENT AS PER ANY APPLICABLE CODES AND/OR MANUFACTURER RECOMMENDATIONS. MAINTAIN CODE-REQUIRED MINIMUM CLEARANCES ABOVE AND IN FRONT OF ALL ELECTRICAL PANELS, INCLUDING THOSE INCLUDED AS A PART OF MECHANICAL EQUIPMENT.
- ALL POINTS INDICATED ON CONTROLS DRAWINGS SHALL BE, AT A MINIMUM, INCLUDED ON GRAPHICS THROUGH BAS.
- FOR EQUIPMENT PROVIDED WITH BACNET OR MODBUS CONTROLLERS/COMMUNICATION INTERFACES, PROVIDE SUB-GRAPHICS THROUGH THE BAS. THE GRAPHIC SHALL DISPLAY ALL POINTS LISTED IN INDIVIDUAL CONTROL DIAGRAMS. PROVIDE ADDITIONAL READ/WRITE POINTS UPON REQUEST BY THE OWNER FOR SUCH EQUIPMENT.
- PROVIDE ALL DEVICES SHOWN IN THE DIAGRAMS NOT PROVIDED BY THE UNIT MANUFACTURER AS REQUIRED TO PROVIDE THE DESIRED SEQUENCE OF OPERATION. REFER TO INDIVIDUAL CONTROL DIA.
- UNLESS OTHERWISE NOTED, ROOM THERMOSTATS AND/OR HUMIDISTATS SHALL HAVE SET-POINT ADJUSTMENT CAPABILITY AND TEMPERATURE/HUMIDITY DISPLAY.

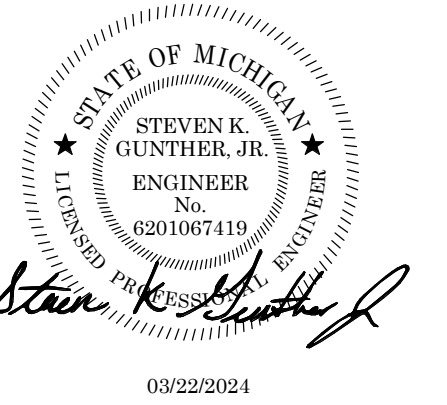
DDC SYSTEM ARCHITECTURE
NO SCALE



CONTROL:

- UNIT SHALL OPERATE FROM PACKAGED CONTROLS.

ELECTRIC CABINET UNIT HEATER CONTROL DIAGRAM
NO SCALE



LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES DATE
CONSTRUCTION DOCUMENTS 03/22/2024

KEY PLAN

JOB NO. 2616.04

SHEET TITLE
MECHANICAL CONTROLS

SHEET NO.
M8.0



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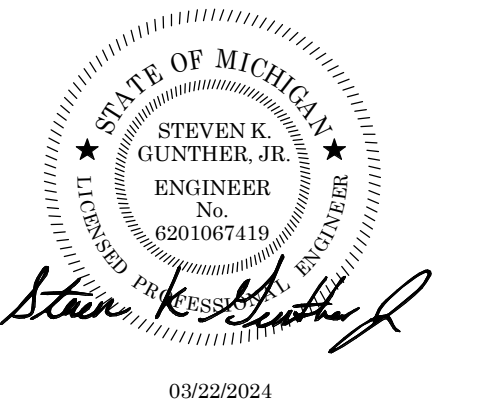


PLUMBING DEMOLITION KEYNOTES

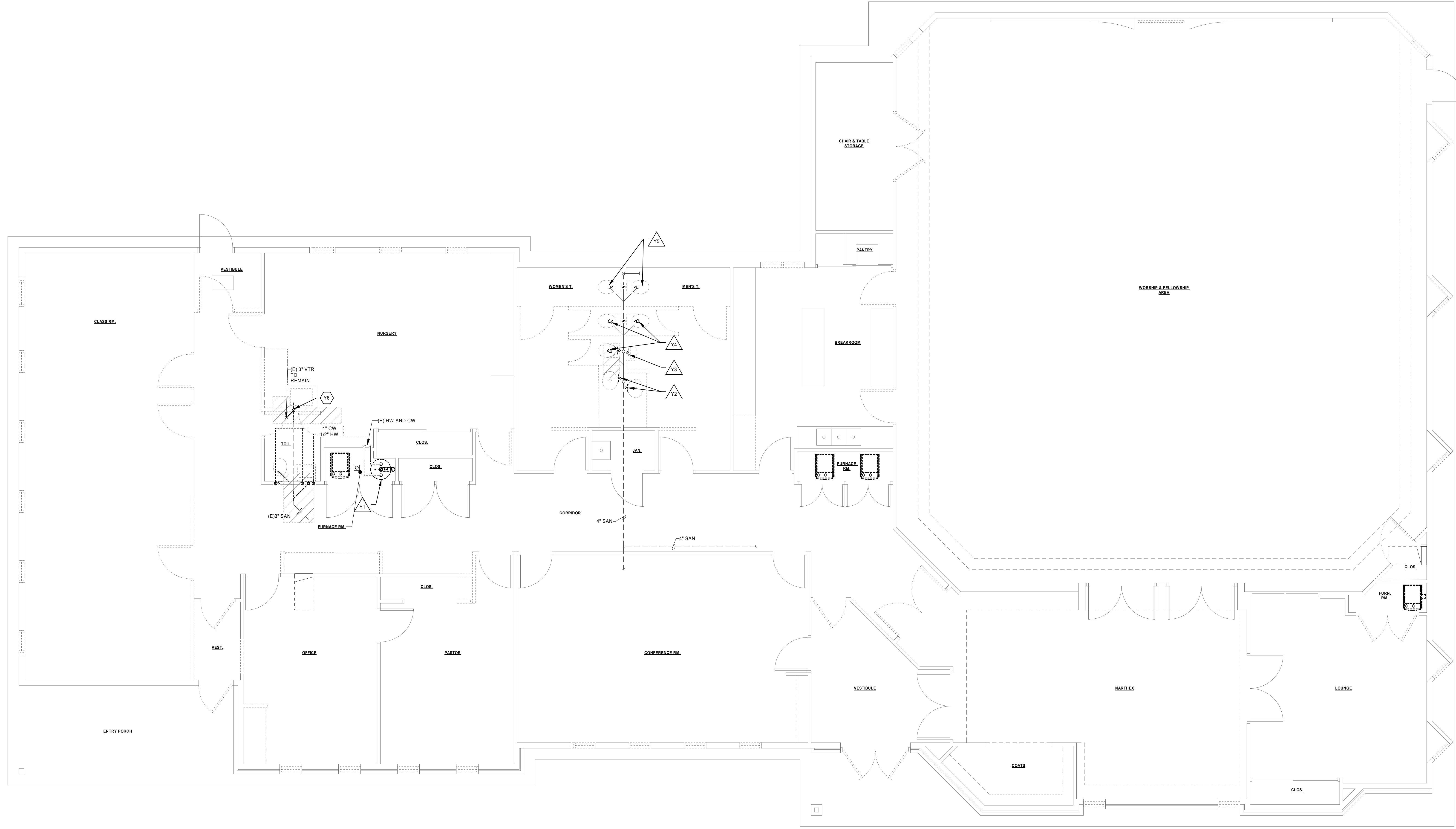
- Y1 EXISTING WATER HEATER TO BE REMOVED. ALL WATER PIPING TO BE DISCONNECTED AND REMAIN IN PLACE FOR FUTURE USE. ALL OTHER SYSTEMS INCLUDING NATURAL GAS, DRAINAGE, FLUE SHALL BE REMOVED COMPLETE, INCLUDING ALL CONNECTIONS AND CONNECTION SPECIALTIES, SUPPORTS, DAMPERS, CONTROLS AND VALVING.
- Y2 DEMOLISH EXISTING LAVATORY, CAP CW AND HW. SANITARY TO BE DEMOLISHED BACK TO WALL. CAP SANITARY AT WALL.
- Y3 DEMOLISH URINAL AND SUPPORTS COMPLETE. CAP SANITARY PIPING WITHIN WALL. CAP HW AND CW WITHIN WALL.
- Y4 DEMOLISH WATER CLOSET, CAP SANITARY UNDER FLOOR. CAP CW WITHIN WALL.
- Y5 DEMOLISH WATER CLOSET, SANITARY TO BE EXTENDED TO NEW WATER CLOSET. CW TO BE CAPPED AT WALL.
- Y6 DEMOLISH EXISTING SINK. REMOVE SANITARY BACK TO BELOW FLOOR. REMOVE VENT UP TO VENT STACK THROUGH ROOF. VENT THRU ROOF TO BE REUSED.

MECHANICAL DEMOLITION NOTES

- 1. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF WORK TO BE PERFORMED. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
- 2. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH EXISTING SITE CONDITIONS, SYSTEMS, AND UTILITIES. NOTIFY ARCHITECT OF ANY INTERFERENCES OR DISCREPANCIES.
- 3. VERIFY DEPTH, SIZE, LOCATIONS AND CONDITION OF EXISTING UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION PRIOR TO STARTING ANY WORK.
- 4. ANY INTERRUPTIONS OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESENT BUILDING'S OPERATION.
- 5. ALL ITEMS ON DEMOLITION PLANS SHALL BE CONSIDERED EXISTING UNLESS OTHERWISE NOTED. ALL WORK INDICATED ON PLANS HAS BEEN LOCATED PER EXISTING DRAWINGS AND/OR FIELD OBSERVATION AND REQUIRES FIELD VERIFICATION.
- 6. ALL ITEMS INDICATED WITH BROKEN LINES SHALL BE REMOVED COMPLETE, WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS, INSULATION, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTS.
- 7. ALL EXISTING WORK TO REMAIN SHALL BE PROTECTED FROM DAMAGE. WHERE DUCT OR PIPE INSULATION HAS BEEN DAMAGED DURING DEMOLITION, THE CONTRACTOR SHALL REPAIR INSULATION AS REQUIRED TO MATCH EXISTING.
- 8. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL EQUIPMENT BEING REMOVED. ALL ITEMS REMOVED SHALL BE LEGALLY DISPOSED OF. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING RELOCATED AND OWNER PROVIDED EQUIPMENT.



03/22/2024



FIRST FLOOR PLUMBING DEMOLITION PLAN
SCALE: 1/4" = 1'-0"

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES	DATE
CONSTRUCTION DOCUMENTS	03/22/2024

KEY PLAN

JOB NO. 2616.04
SHEET TITLE
FIRST FLOOR PLUMBING DEMOLITION PLAN

SHEET NO.
PD1.1



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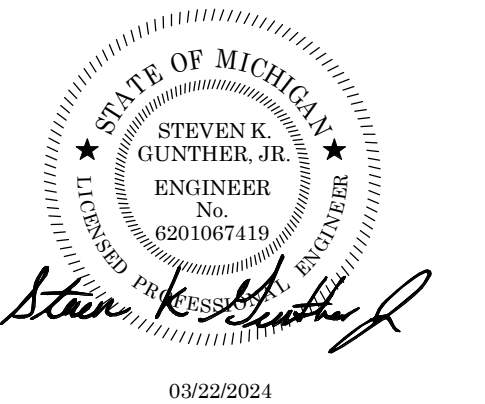


PLUMBING KEYNOTES

- P1 EXTEND 1-1/2" VENT TO NEAREST VENT MAIN. CONTRACTOR TO CONFIRM EXACT LOCATION AND ROUTING.
- P3 RECONNECT COLD WATER, HOT WATER, AND NATURAL GAS TO NEW WATER HEATER. PROVIDE NEW SHUTOFF VALVES. ROUTE NEW 4" FLOOR UP THROUGH ROOF. TERMINATE PER MANUFACTURER'S INSTRUCTIONS.
- P5 REWORK UNDERGROUND SANITARY TO CONNECT TO NEW WATER CLOSET. RECONNECT CW TO NEW WATER CLOSET.
- P6 NEW URINAL TO BE CONNECTED TO EXISTING URINAL SANITARY AND VENT. EXTEND SANITARY TO NEW URINAL WITHIN WALL.
- P7 EXTEND AND CONNECT 1/2" HWWS TO HOT WATER AFTER LAST FIXTURE CONNECTION. REFER TO LAVATORY HW/HWR PIPING DIAGRAM.
- P8 CONNECT NEW LAVATORIES TO EXISTING 2" SANITARY STUB. VERIFY VENT IS CONNECTED TO SANITARY AND VENT SYSTEM. EXTEND CW AND HW TO NEW LAVATORIES.
- P9 CONNECT NEW LAVATORY TO CW AND HW PIPING IN AREA. EXTEND SANITARY AND VENT. CONTRACTOR TO CONFIRM EXACT ROUTING.
- P10 CONNECT NEW SANITARY TO EXISTING SANITARY MAIN. CONTRACTOR TO VERIFY EXACT EXISTING SANITARY LOCATION. EXTEND 3/4" COLD WATER TO WATER CLOSET AND CONNECT.

PLUMBING GENERAL NOTES

1. THESE DRAWINGS ARE DIAGRAMMATIC & INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PLUMBING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING REQUIRED COMPONENTS, OFFSETS REQUIRED TO AVOID THE STRUCTURE, ETC.
2. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHT OF ALL PLUMBING FIXTURES, BOTH STANDARD AND BARRIER FREE. REFER TO PLUMBING FIXTURE SCHEDULE FOR FIXTURE TYPES, BRANCH CONNECTION SIZES AND ADDITIONAL REQUIREMENTS.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH THE STATE AND LOCAL COUNTY DEPARTMENT OF HEALTH CROSS CONTAMINATION CODE REQUIREMENTS.
4. VERIFY DEPTH, SIZE, LOCATION AND CONDITION OF ALL UTILITIES IN THE FIELD, INCLUDING POINTS OF CONNECTION, PRIOR TO STARTING ANY WORK. NOTIFY THE ARCHITECT/ENGINEER OF ANY INTERFERENCES OR DISCREPANCIES.
5. CONTRACTOR SHALL COORDINATE THE INSTALLATION OF PLUMBING AND PIPING WORK WITH THE WORK OF ALL OTHER TRADES, EXISTING SITE CONDITIONS, AND EQUIPMENT MANUFACTURER RECOMMENDATIONS. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY NEW WORK.
6. PIPING SHALL BE ROUTED AS HIGH AS POSSIBLE AND SHALL MAINTAIN REQUIRED CLEARANCES OVER, AROUND AND IN FRONT OF ALL ELECTRICAL EQUIPMENT, PANELS, TRANSFORMERS, ETC. PIPING SHALL NOT INTERFERE WITH OR BE INSTALLED IN A LOCATION THAT RESTRICTS ACCESS OR CLEARANCE TO ELECTRICAL OR MECHANICAL DEVICES. PROVIDE REQUIRED ACCESS AND CLEARANCE AROUND ALL EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS.
7. CONTRACTOR SHALL PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL PLUMBING SYSTEMS.
8. PROVIDE BRANCH LINE ISOLATION VALVES ON DOMESTIC PIPING TO EACH GROUP OF FIXTURES AND TOILET ROOMS.
9. PLUMBING VENT PIPING THRU THE ROOF SHALL BE LOCATED 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.
10. PROVIDE CODE REQUIRED CLEARANCE ACCESS DOORS FOR VALVES/CLEANOUTS LOCATED IN WALLS OR ABOVE HARD CEILING. COORDINATE LOCATIONS WITH ARCHITECT. PROVIDE CLEANOUTS AT THE BASE OF ALL STACKS.
11. RUN ALL SANITARY AND STORM PIPING 2 1/2" OR LESS AT 1/4" PER FOOT AND 3" AND LARGER PIPING AT 1/8" PER FOOT MINIMUM UNLESS OTHERWISE NOTED. MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".
12. PROVIDE "IN-LINE" TRAP SEAL PROTECTION OR TRAP PRIMER ON ALL FLOOR DRAINS AND TRAPS SUBJECT TO EVAPORATION.
13. AT EACH CONNECTION OF GAS SUPPLY TO EQUIPMENT PROVIDE A UNION, SHUT-OFF VALVE, TEE WITH SEDIMENT TRAP & PRESSURE TEST PLUG. REGULATOR AND UNION, FOR MEDIUM PRESSURE REGULATORS, AN ADDITIONAL TEE WITH PRESSURE TEST PLUG SHALL BE INSTALLED NOT LESS THAN 10 PIPE DIAMETERS DOWNSTREAM. SEDIMENT TRAPS SHALL BE INSTALLED SUCH THAT THERE IS ROOM BELOW TO REMOVE THE CAPPLUG AND CLEAN THE TRAP. WEATHERPROOF PAINT ALL EXTERIOR GAS PIPING.
14. THE CEILING SPACE IS USED AS A RETURN AIR PLenum AND PLASTIC MATERIALS INCLUDING PVC PIPING, CONDUIT, WIRING, ETC. SHALL BE USED. ALL MATERIAL IN THE CEILING SPACE IS TO BE PLENUM RATED.



LANSING SCHOOL DISTRICT
 2024 District Projects
NEWCOMER CENTER REMODELING
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ISSUANCES CONSTRUCTION DOCUMENTS DATE 03/22/2024

KEY PLAN

JOB NO. 2616.04 NORTH

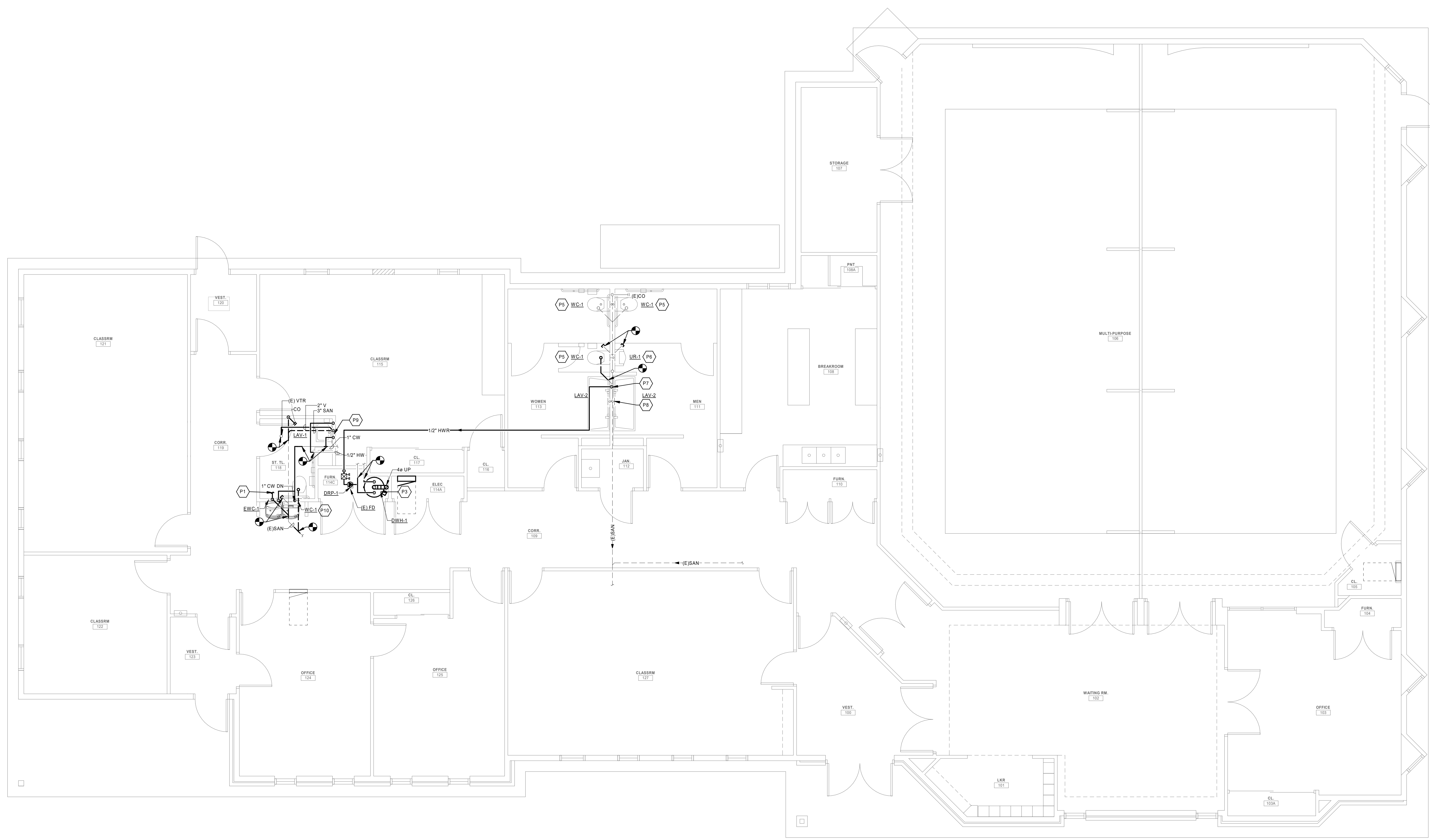
SHEET TITLE FIRST FLOOR PLUMBING PLAN

SHEET NO. P1.1



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Kalamazoo, Michigan



FIRST FLOOR PLUMBING PLAN
 SCALE: 1/4" = 1'-0"

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PLUMBING FIXTURES/SPECIALTIES SCHEDULE

TAG	BARRIER FREE	ITEM	PIPE CONNECTION SIZES				MANUFACTURER & MODEL NO.	ACCESSORIES
			WASTE	VENT	CW	HW		
EWC-1	Y	ELECTRIC WATER COOLER - BLEVEL WITH BOTTLE FILLER	1 1/2"	1 1/2"	1/2"	1/2"	ELKAY LMBFTLWBSK	120V, 1 PH, 5 FLA, 370 WATTS, SHUT OFF VALVE AND 1-1/2" P-TRAP. VISUAL FILTER MONITOR. PROVIDE REPLACEMENT FILTERS (3-PACK)
LAV-1	Y	LAVATORY - WALL MOUNTED	1 1/2"	1 1/2"	1/2"	1/2"	KOHLER K-2032 WITH SLOAN ETT-600	VITREOUS CHINA WALL HUNG WITH FRONT OVERFLOW. FAUCET SHALL BE SENSOR OPERATED WITH OUTLET WITH 0.5 GPM MAX FLOW RATE. PROVIDE WITH ASSE 1070 MIXING VALVE.
LAV-2	Y	LAVATORY - WALL MOUNTED BASIN	1 1/2"	1 1/2"	1/2"	1/2"	BRADLEY LVA2D WITH BRADLEY VERGE SS3-3500 FAUCET	VITREOUS CHINA 60" X 20" X 21" DUAL STATION WALL MOUNTED WITH QUARTZ EVERO CLASSIC - DEO SERIES ANTARCTICA FINISH. VERGE LINEA SERIES FAUCET SHALL BE TOUCH FREE VANDAL RESISTANT OUTLET WITH 0.5 GPM MAX FLOW RATE. SILICONE TIP WITH BRUSHED STAINLESS FINISH. PROVIDE WITH BATTERY FAUCET. PROVIDE WITH ASSE 1070 MIXING VALVE. PROVIDE WITH BR 85 TRENCH DRAIN CAP
UR-1	Y	URINAL - WALL MOUNTED	2"	1 1/2"	3/4"		KOHLER DEXTER K-6018-ET WITH SLOAN ROYAL 186-F FLUSH VALVE	ADA, VITREOUS CHINA, WALL MOUNTED, TOP SPUD, DIAPHRAGM-TYPE, POLISHED CHROME MANUAL FLUSH VALVE, 1.0 GPF
WC-1	Y	WATER CLOSET - FLUSH VALVE, FLOOR MOUNTED	3"	1 1/2"	1"		KOHLER K-4605-SS WITH SLOAN ROYAL 111-1.6	ADA, VITREOUS CHINA, WALL MOUNTED, ELONGATED BOWL, TOP SPUD, ANTIMICROBIAL FINISH, PROVIDE OLSOMITE 95CT ELONGATED TOILET SEAT. HEAVY DUTY, OPEN FRONT SEAT, DIAPHRAGM-TYPE, POLISHED CHROME MANUAL FLUSH VALVE, 1.6 GPF

- NOTES:
1. PROVIDE ALL SLEEVES, TEMPLATES, HARDWARE, ACCESSORIES, ETC. REQUIRED FOR A COMPLETE AND OPERABLE INSTALLATION. VERIFY ALL COLORS AND FINISHES WITH ARCHITECT AND REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHT OF ALL FIXTURES.
2. PROVIDE CARRIERS FOR ALL APPLICABLE FIXTURES PER MANUFACTURER'S RECOMMENDATIONS. CONCEALED ARM CARRIERS REQUIRED FOR SINGLE STATION LAVATORIES. PROVIDE ALL CARRIERS WITH FOOT SUPPORTS.
3. WHERE REQUIRED AND/OR DESIGNATED, FIXTURES SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE STATE'S BARRIER FREE DESIGN REQUIREMENTS & ICCANS117.1. ALL EXPOSED LAVATORY AND SINK TRIM ON WHEELCHAIR ACCESSIBLE FIXTURES SHALL BE COVERED WITH A SEAMLESS ANTIMICROBIAL VINYL INSULATING OUTER SHELL.
4. PROVIDE ASSE 1072 BARRIER-TYPE INLINE TRAP SEAL DEVICES FOR EACH FLOOR DRAIN AND FLOOR SINK AND TRAP SUBJECT TO EVAPORATION LOSS.
5. PROVIDE COMMERCIAL GRADE SUPPLIES TO SINKS AND LAVATORIES WITH CHROME PLATED BRASS LOOSE KEY ANGLE STOPS WITH BRASS STEMS (NO PLASTIC STEMS), WHERE APPLICABLE PROVIDE ESCUTCHEON PLATE.
6. PROVIDE POINT OF USE THERMOSTATIC MIXING VALVES, ASSE 1070, FOR ALL ADA SINKS AND HANDWASHING SINKS.

DOMESTIC WATER HEATER SCHEDULE (GAS TANK TYPE)

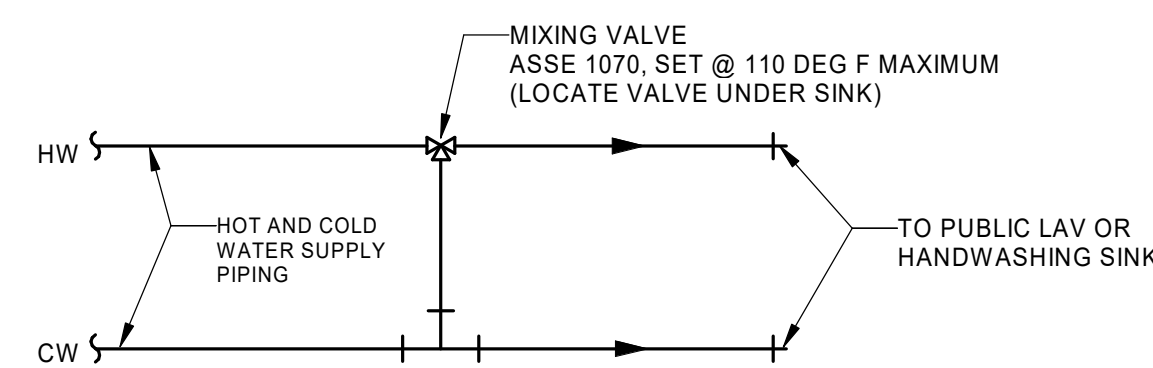
UNIT ID	STORAGE CAPACITY (GAL)	FUEL TYPE	GAS PRESS. MIN-MAX (IN WG)	INPUT (MBH)	RECOVERY AT 90°F (GPH)	THERMAL EFFICIENCY	ELECTRICAL		DISCONNECT		MANUFACTURER / MODEL NO.	REMARKS
							VOLTS	PHASE	FURN. BY	INST. BY		
DWH-1	50	NG	4-11	40	43	80%	115	1	DIV 28	TOGGLE	BELL AND GOSSET NBF-105LW	

- NOTES:
1. EXPANSION TANK SHALL BE ASME, MFG. BAG, MODEL PTA-12V, QTY: 1, REQ. TANK VOLUME: 5 GAL, REQ. ACCEPTANCE VOL: 3 GAL, VERTICAL DIAPHRAGM.

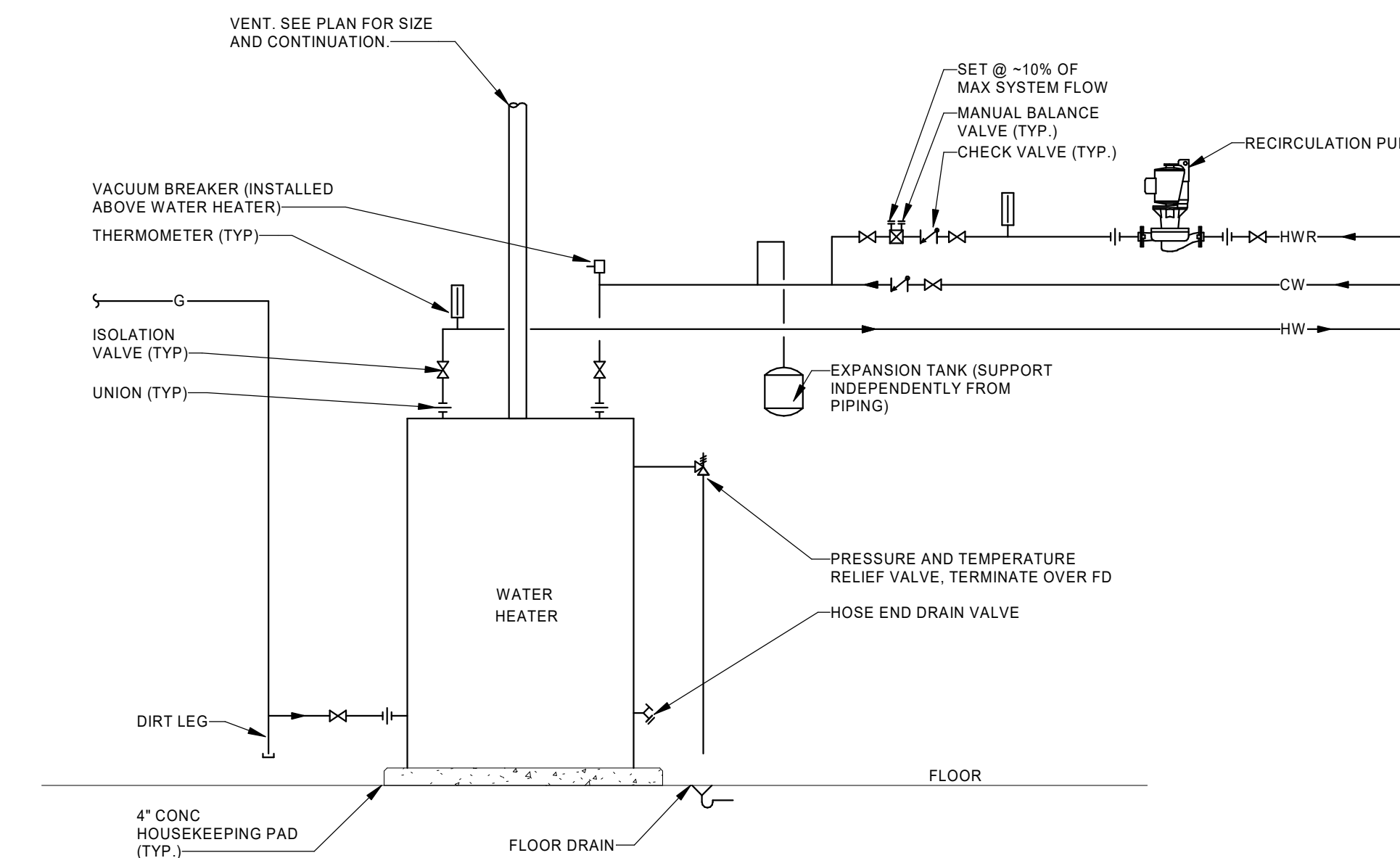
DOMESTIC HOT WATER RECIRCULATION PUMP SCHEDULE

UNIT ID	SYSTEM SERVED	TYPE	FLOW (GPM)	HEAD (FT)	ELECTRICAL			DISCONNECT		STARTER		MANUFACTURER / MODEL NO.	REMARKS	
					KW (INPUT)	BHP	HP	VOLTS	PHASE	FURN. BY	INST. BY			TYPE
DRP-1	DOMESTIC	INLINE	2	10	0.52	0.03	-	115	1	EC	EC	SWITCH	AQUASTAT NBF-105LW	

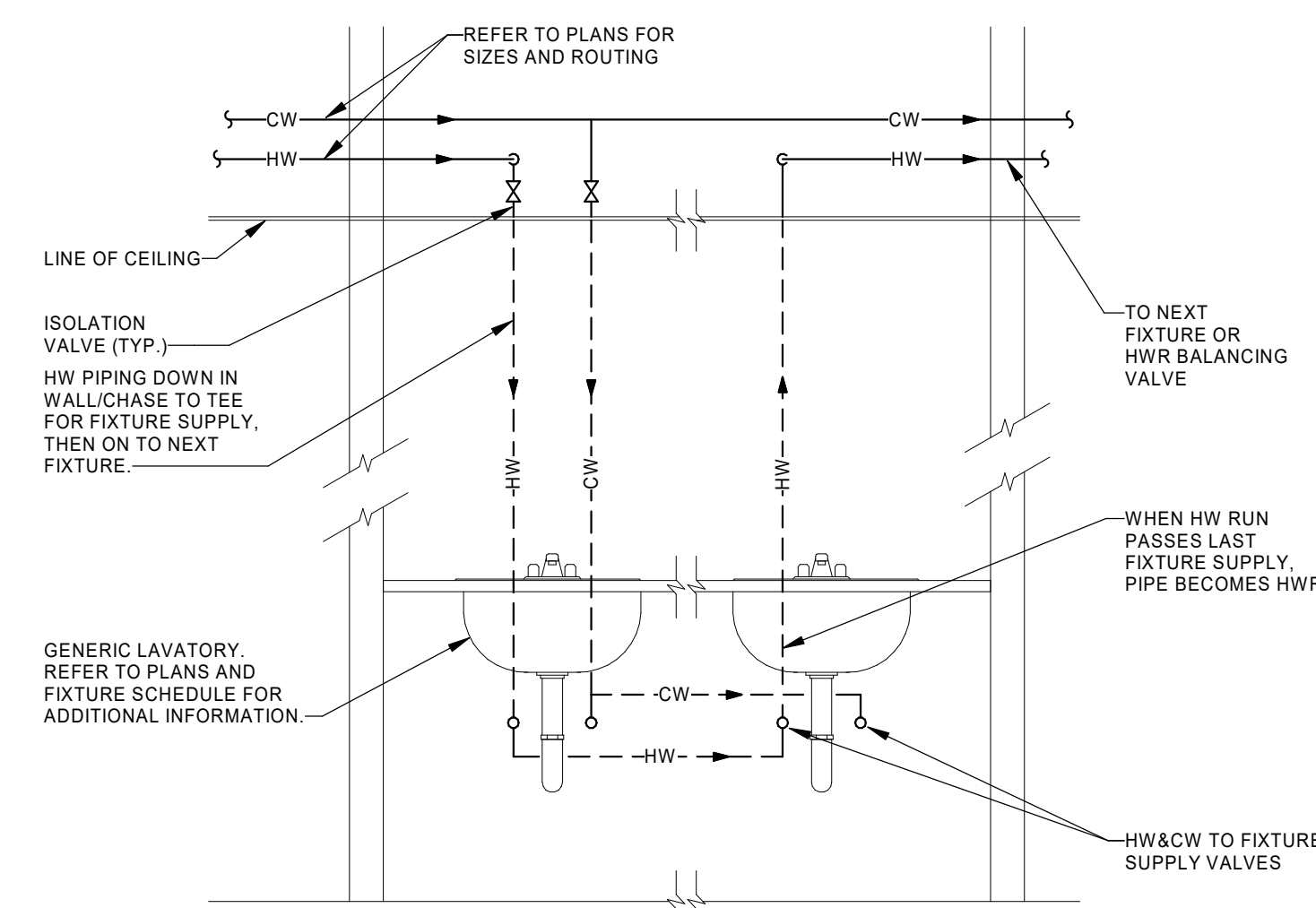
- NOTES:
1. PERFORMANCE IS BASED ON WATER UNLESS OTHERWISE NOTED
2. PUMPS SHALL BE NON-OVERLOADING
3. PUMPS SHALL BE INSTALLED IN ORIENTATION RECOMMENDED BY MFG.



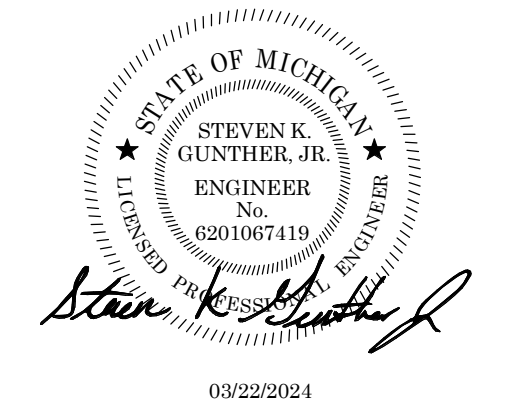
POINT OF USE THERMOSTATIC MIXING VALVE DETAIL
NO SCALE



WATER HEATER - GAS FIRED PIPING DIAGRAM W/ EXP TANK AND RECIRC PUMP
NO SCALE



TYPICAL LAVATORY HW / HWR PIPING DETAIL
NO SCALE



LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES CONSTRUCTION DOCUMENTS DATE 03/22/2024

KEY PLAN

JOB NO. 2616.04

SHEET TITLE
PLUMBING DETAILS & SCHEDULES

SHEET NO.

P5.0



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COPPER FEEDER SCHEDULE

Table with columns for Feeder (Amps), Cond. Size, 2 Wire with Ground, Feeder (Amps), Cond. Size, 3 Wire with Ground, Feeder (Amps), Cond. Size, 4 Wire with Ground.

NOTES: 1. AMPACITIES FOR FEEDER SIZES ARE BASED ON N.E.C. CODE 110-14... 2. CONDUIT FILL IS BASED ON 40% FILL USING SINGLE CONDUCTOR BUILDING WIRE...

ELECTRICAL ABBREVIATIONS

Table with columns for Abbrev., Description, Abbrev., Description, Abbrev., Description, Abbrev., Description.

DRAWING NOTATION

Table with columns for Symbol, Description, Symbol, Description, Symbol, Description, Symbol, Description.

DRAWING INDEX

Table with columns for Sheet No., Description.

POWER SYMBOL LIST

Table with columns for Symbol, Description.

NOTES: 1. ALL DEVICE RATINGS/SIZES SHALL BE COORDINATED WITH PLANS AND SCHEDULES.

TECHNOLOGY SYMBOL LIST

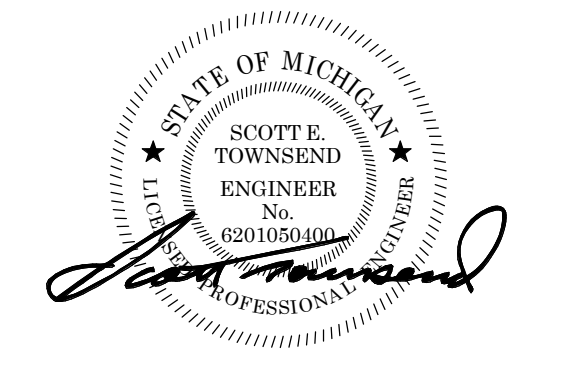
Table with columns for Symbol, Description.

NOTES: 1. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR BOX AND CONDUIT FOR ALL DEVICES INDICATED...

FIRE ALARM SYMBOL LIST

Table with columns for Symbol, Description.

NOTES: 1. DRAWINGS INDICATE DESIGN INTENT ONLY, FINAL LOCATIONS AND DEVICE SPECIFICATIONS SHALL BE PROVIDED BY FIRE ALARM MANUFACTURER...



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APPLICABLE CODES AND REGULATIONS

Table with columns for Year, Code.

LIGHTING CONTROLS LEGEND

Table with columns for Symbol, Description.



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KEY PLAN

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SHEET TITLE
ELECTRICAL GENERAL INFORMATION

SHEET NO.



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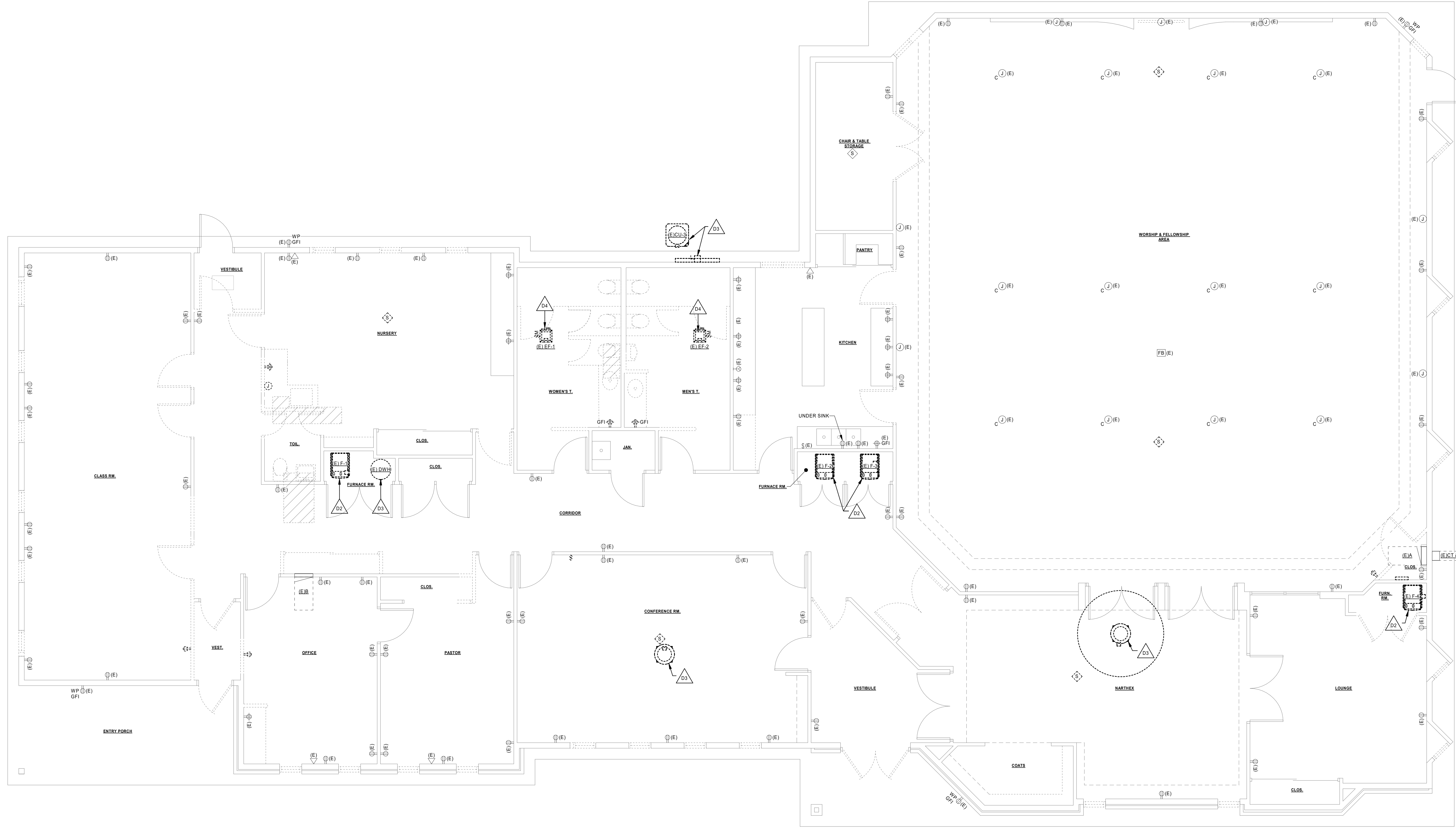
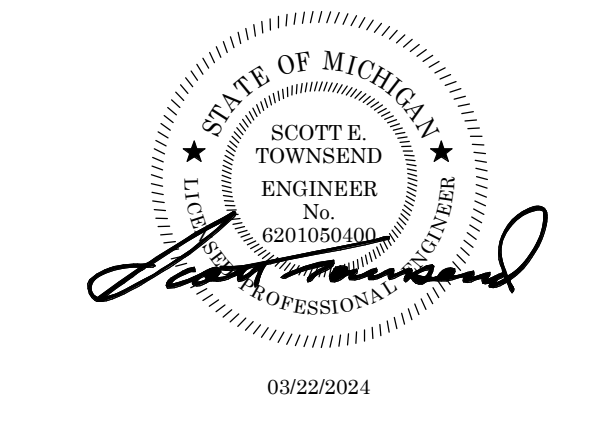


ELECTRICAL DEMOLITION KEYNOTES

- D1 REMOVE ALL EXISTING EXIT SIGNS, EMERGENCY BATTERY UNITS, INTERIOR LUMINAIRES, AND EXTERIOR BUILDING MOUNTED LUMINAIRES WITH ASSOCIATED CONTROLS, OCCUPANCY SENSORS AND WALL SWITCHES. TAKE WIRING BACK TO SOURCE. PROTECT EXISTING CEILING PENETRATION AND MAINTAIN FIRE RATING AT PENETRATIONS FOR INSTALLATION OF NEW LUMINAIRES AND CONTROLS.
- D2 FURNACE TO BE REMOVED BY MECHANICAL CONTRACTOR AS PART OF DEMOLITION SCOPE. EC TO SAVE AND PROTECT CIRCUITING FOR REUSE WITH NEW EQUIPMENT TO BE INSTALLED DURING NEW WORK PHASE.
- EC TO REMOVE ALL ELECTRICAL COMPONENTS ASSOCIATED WITH DEMOLISHED MECHANICAL EQUIPMENT AND REMOVE WIRING BACK TO SOURCE PANEL.
- D3 EXHAUST FAN TO BE REMOVED BY MECHANICAL CONTRACTOR AS PART OF DEMOLITION SCOPE. EC TO SAVE AND PROTECT CIRCUITING FOR REUSE WITH NEW EQUIPMENT TO BE INSTALLED DURING NEW WORK PHASE.

ELECTRICAL DEMOLITION NOTES

- 1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
- 2. EXAMINE THE DRAWINGS OF OTHER TRADES, BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES.
- 3. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES.
- 4. COORDINATE WITH NEW WORK PLANS, ONE LINE, AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
- 5. COORDINATE ANY SHUTDOWN OF EXISTING SERVICES AND EQUIPMENT REMAINING IN USE WITH OWNERS REPRESENTATIVE. WHERE EXISTING BUILDING SERVICES IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COST TO PERFORM THIS WORK DURING EVENING AND WEEKENDS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER.
- 6. REMOVE ALL CONDUIT AND WIRE BACK TO NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
- 7. WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES TO REMAIN, EXTEND CONDUIT AND WIRE AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE.
- 8. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED AND WALL REMAINS INTACT. MARK ALL UNUSED CIRCUIT BREAKERS AS "SPARE".
- 9. CONTRACTOR TO TAG ALL CIRCUITS AT BOTH ENDS AFFECTED BY THIS SCOPE OF WORK.
- 10. CONTRACTOR SHALL PROVIDE UPDATED, TYPED IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS SCOPE OF WORK.
- 11. CONTRACTOR SHALL VERIFY ALL UNDERGROUND AND IN-SLAB UTILITIES LOCATIONS PRIOR TO SAW CUTTING OR PENETRATING ANY FLOOR SLABS. CONTRACTOR SHALL REPAIR ALL UTILITIES DAMAGED BY SAW CUTTING.



FIRST FLOOR POWER DEMOLITION PLAN
SCALE: 1/4" = 1'-0"

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
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ISSUANCES CONSTRUCTION DOCUMENTS DATE 03/22/2024

KEY PLAN

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SHEET TITLE
FIRST FLOOR POWER DEMOLITION PLAN

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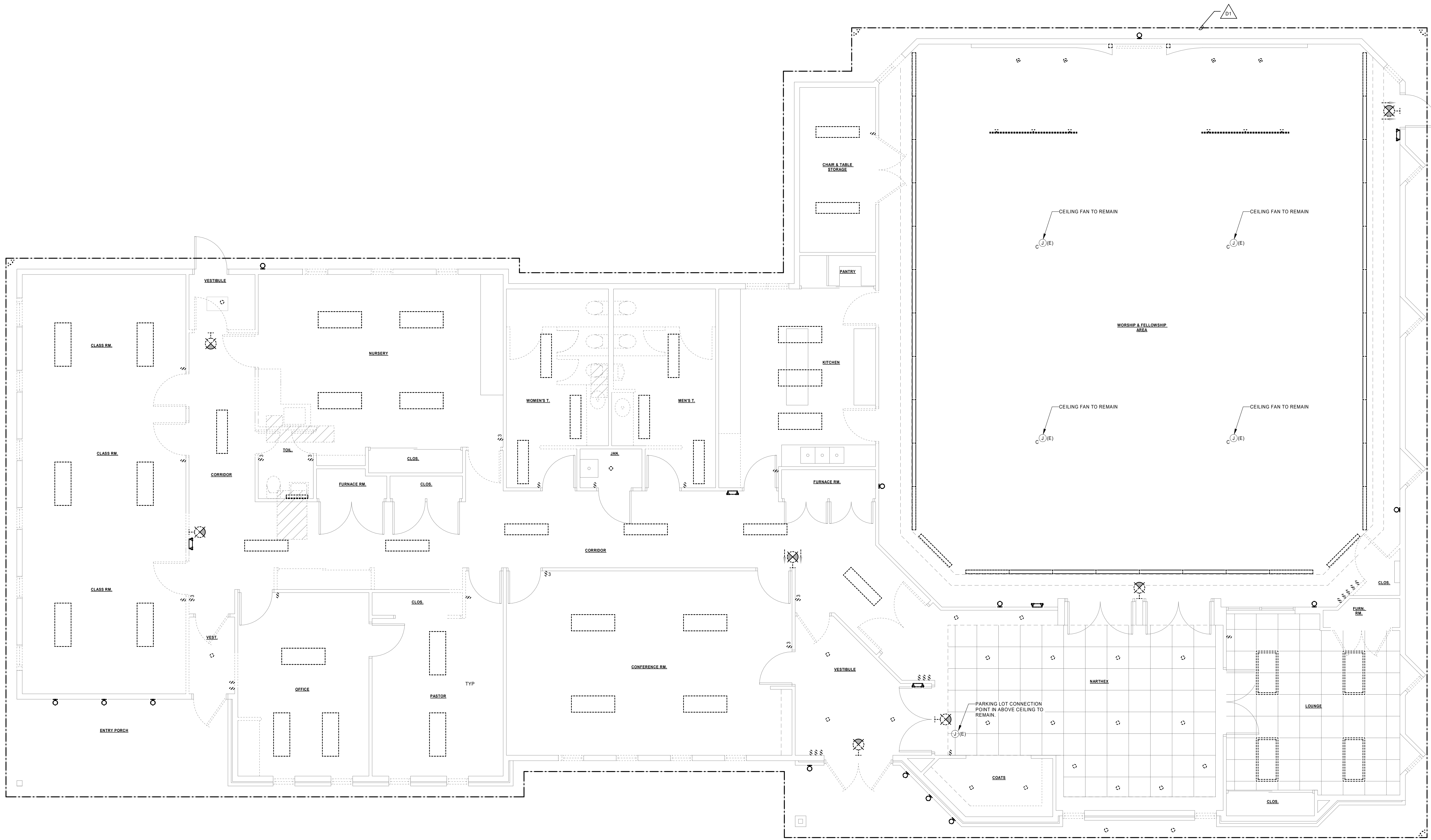
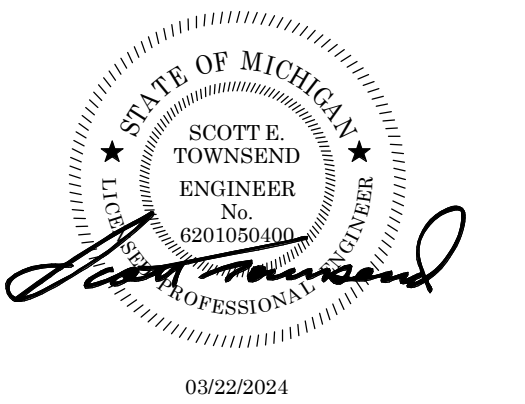


ELECTRICAL DEMOLITION KEYNOTES

- D1 REMOVE ALL EXISTING EXIT SIGNS, EMERGENCY BATTERY UNITS, INTERIOR LUMINAIRES, AND EXTERIOR BUILDING MOUNTED LUMINAIRES WITH ASSOCIATED CONTROLS, OCCUPANCY SENSORS AND WALL SWITCHES. TAKE WIRING BACK TO SOURCE. PROTECT EXISTING CEILING PENETRATION AND MAINTAIN FIRE RATING AT PENETRATIONS FOR INSTALLATION OF NEW LUMINAIRES AND CONTROLS.
- D2 FURNACE TO BE REMOVED BY MECHANICAL CONTRACTOR AS PART OF DEMOLITION SCOPE. EC TO SAVE AND PROTECT CIRCUITING FOR REUSE WITH NEW EQUIPMENT TO BE INSTALLED DURING NEW WORK PHASE.
- EC TO REMOVE ALL ELECTRICAL COMPONENTS ASSOCIATED WITH DEMOLISHED MECHANICAL EQUIPMENT AND REMOVE WIRING BACK TO SOURCE PANEL.
- D3 EXHAUST FAN TO BE REMOVED BY MECHANICAL CONTRACTOR AS PART OF DEMOLITION SCOPE. EC TO SAVE AND PROTECT CIRCUITING FOR REUSE WITH NEW EQUIPMENT TO BE INSTALLED DURING NEW WORK PHASE.

ELECTRICAL DEMOLITION NOTES

- 1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
- 2. EXAMINE THE DRAWINGS OF OTHER TRADES. BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES.
- 3. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES.
- 4. COORDINATE WITH NEW WORK PLANS, ONE LINE, AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
- 5. COORDINATE ANY SHUTDOWN OF EXISTING SERVICES AND EQUIPMENT REMAINING IN USE WITH OWNERS REPRESENTATIVE. WHERE EXISTING BUILDING SERVICES IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COST TO PERFORM THIS WORK DURING EVENING AND WEEKENDS. INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER.
- 6. REMOVE ALL CONDUIT AND WIRE BACK TO NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
- 7. WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM DEVICES TO REMAIN, EXTEND CONDUIT AND WIRE AS REQUIRED TO MAINTAIN ELECTRICAL SERVICE.
- 8. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED AND WALL REMAINS INTACT. MARK ALL UNUSED CIRCUIT BREAKERS AS "SPARE".
- 9. CONTRACTOR TO TAG ALL CIRCUITS AT BOTH ENDS AFFECTED BY THIS SCOPE OF WORK.
- 10. CONTRACTOR SHALL PROVIDE UPDATED, TYPED IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS SCOPE OF WORK.
- 11. CONTRACTOR SHALL VERIFY ALL UNDERGROUND AND IN-SLAB UTILITIES LOCATIONS PRIOR TO SAW CUTTING OR PENETRATING ANY FLOOR SLABS. CONTRACTOR SHALL REPAIR ALL UTILITIES DAMAGED BY SAW CUTTING.



FIRST FLOOR LIGHTING DEMOLITION PLAN
SCALE: 1/4" = 1'-0"

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
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KEY PLAN

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SHEET TITLE
FIRST FLOOR LIGHTING DEMOLITION PLAN

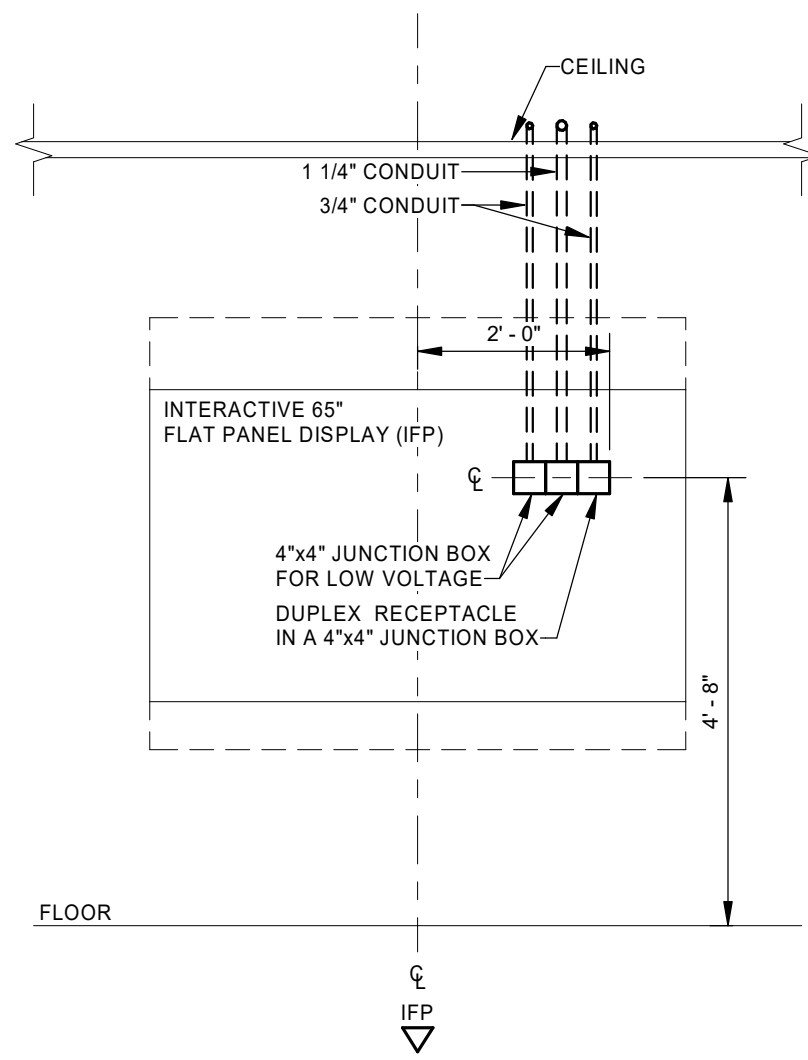
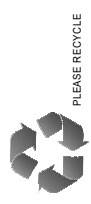
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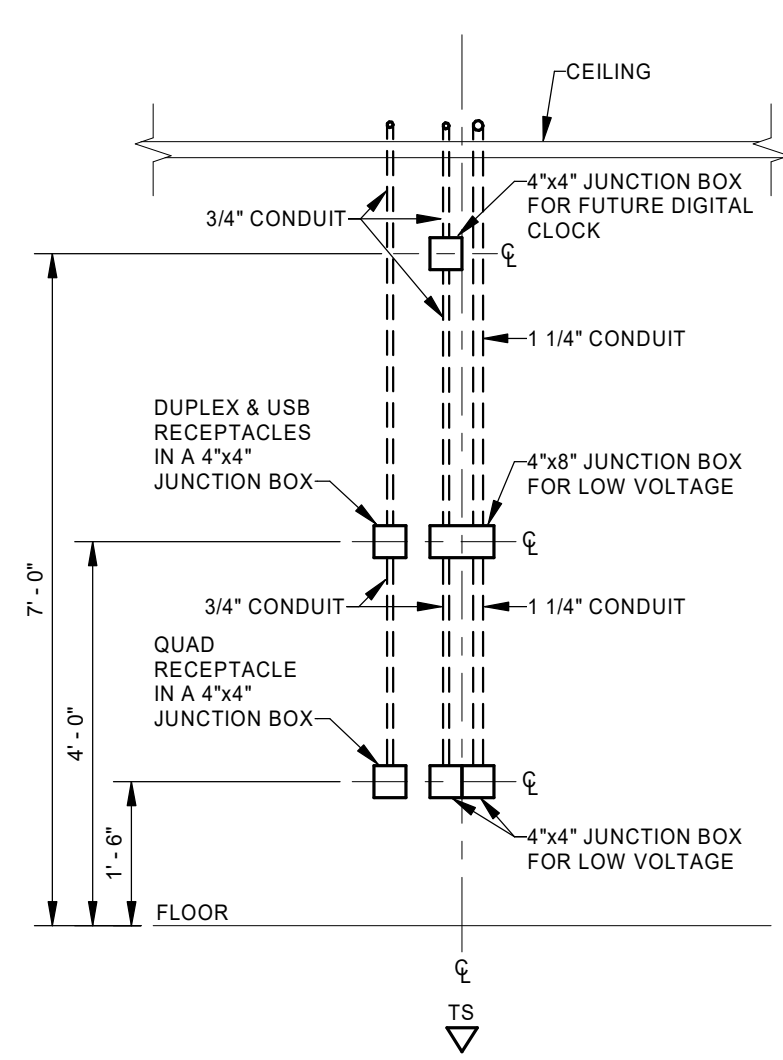
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NOTES:
1. ELECTRICAL CONTRACTOR TO PROVIDE MUD RINGS WHERE REQUIRED BY I.V. REFER TO SPECIFICATION FOR POWER DEVICES COVERS.

TYPICAL CLASSROOM INTERACTIVE FLAT PANEL (IFP) DETAIL
NO SCALE



NOTES:
1. ELECTRICAL CONTRACTOR TO PROVIDE MUD RINGS WHERE REQUIRED BY I.V. REFER TO SPECIFICATION FOR POWER DEVICES COVERS.

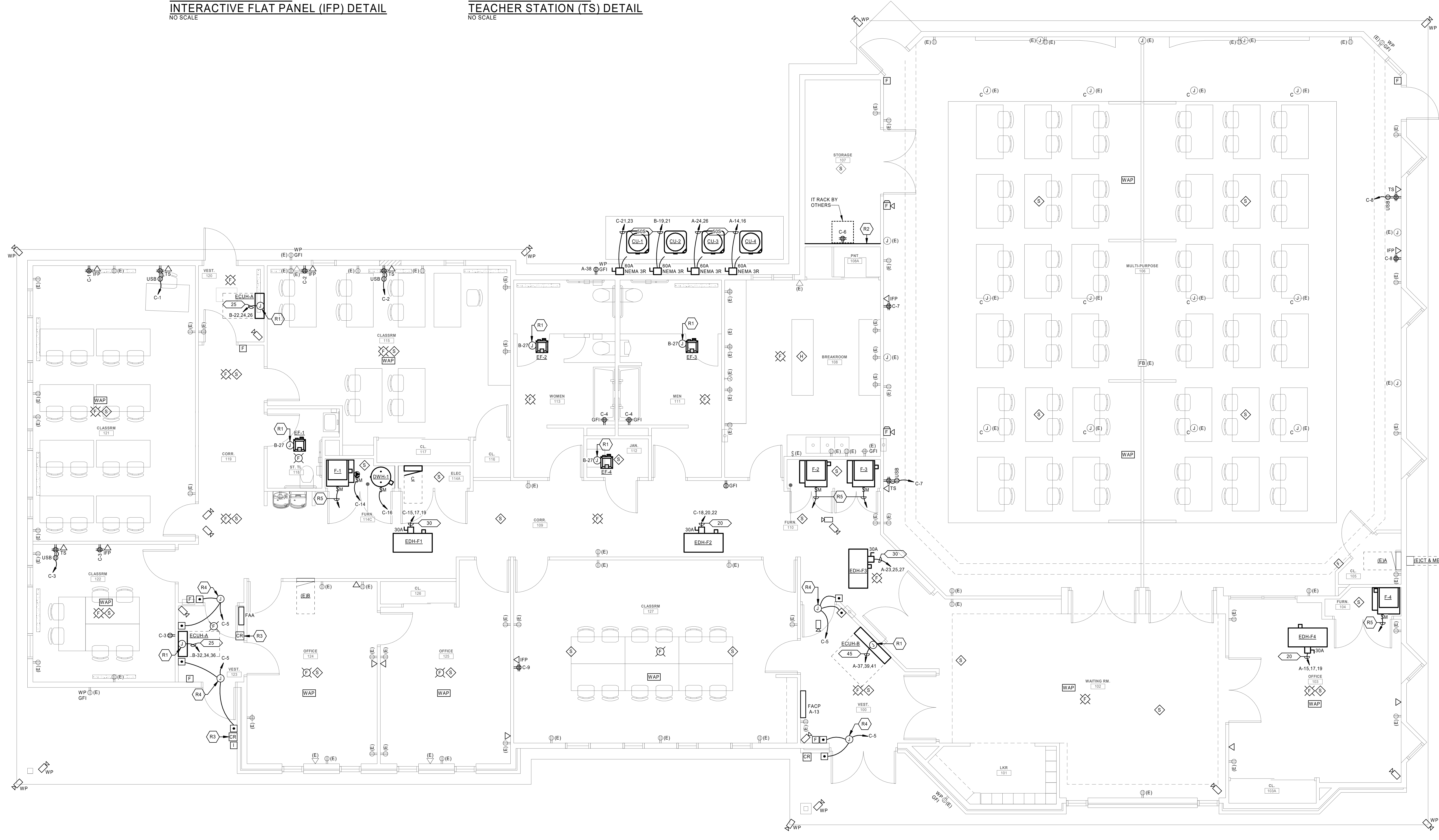
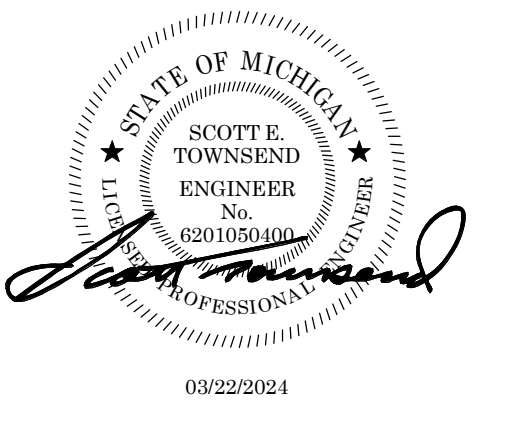
TYPICAL CLASSROOM TEACHER STATION (TS) DETAIL
NO SCALE

POWER KEYNOTES

- R1 EQUIPMENT DISCONNECT PROVIDED BY MANUFACTURER. EC TO PROVIDE POWER CONNECTION FOR EQUIPMENT AS INDICATED. COORDINATE INSTALLATION WITH MECHANICAL TRADES AND FINAL EQUIPMENT SUBMITTAL POWER REQUIREMENTS.
- R2 PROVIDE 4" X 8" X 3/4" FIRE RETARDANT PLYWOOD BACKBOARD ON INDICATED WALLS. REFER TO LOW VOLTAGE DRAWINGS FOR ADDITIONAL INFORMATION.
- R3 PROVIDE LINK BETWEEN CARD READER AND AUTOMATIC DOOR SD DOOR ACTUATOR ONLY ACTIVATES UPON USE OF CARD READER. COORDINATE WITH SECURITY AND LOW VOLTAGE CONTRACTORS.
- R4 PROVIDE POWER TO DOOR OPENER ACTUATOR FOR AUTOMATIC DOORS. COORDINATE EXACT LOCATION PRIOR TO ROUGH-IN.
- R5 REUSE EXISTING CIRCUIT FOR NEW EQUIPMENT LOCATED IN THE SAME PLACE.

POWER GENERAL NOTES

- 1. ALL RECEPTACLES ON EXTERIOR, IN KITCHEN, IN CONCESSION, IN LABORATORY AND WITHIN 6'-0" OF SINK OR OTHER WATER SUPPLY SHALL BE READILY ACCESSIBLE GFCI TYPE RECEPTACLE.
- 2. REFER TO ARCHITECTURAL FLOOR PLANS AND ELEVATIONS TO VERIFY LOCATION OF DEVICES.
- 3. ALL CONDUITS SERVING 120 VOLTS OR GREATER SHALL INCLUDE A GROUND WIRE.
- 4. ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS NOTED OTHERWISE.
- 5. ALL 120 VOLT CIRCUITS SHALL UTILIZE A SEPARATE NEUTRAL.
- 6. ALL EXISTING AND NEW RECEPTACLES SHALL BE TAMPER-PROOF STYLE WITH THE EXCEPTION OF THE EMPLOYEE BREAK ROOM!
- 7. ALL PENETRATIONS IN RATED WALLS AND CEILING SHALL BE CAULKED AND SEALED TO MAINTAIN FIRE RATING.



FIRST FLOOR POWER PLAN
SCALE: 1/4" = 1'-0"

LANSING SCHOOL DISTRICT
2024 District Projects
NEWCOMER CENTER REMODELING
301 WEST JOLLY ROAD, LANSING, MI 48910



ISSUANCES CONSTRUCTION DOCUMENTS DATE 03/22/2024

KEY PLAN

JOB NO. 2616.04 NORTH
SHEET TITLE
FIRST FLOOR POWER PLAN



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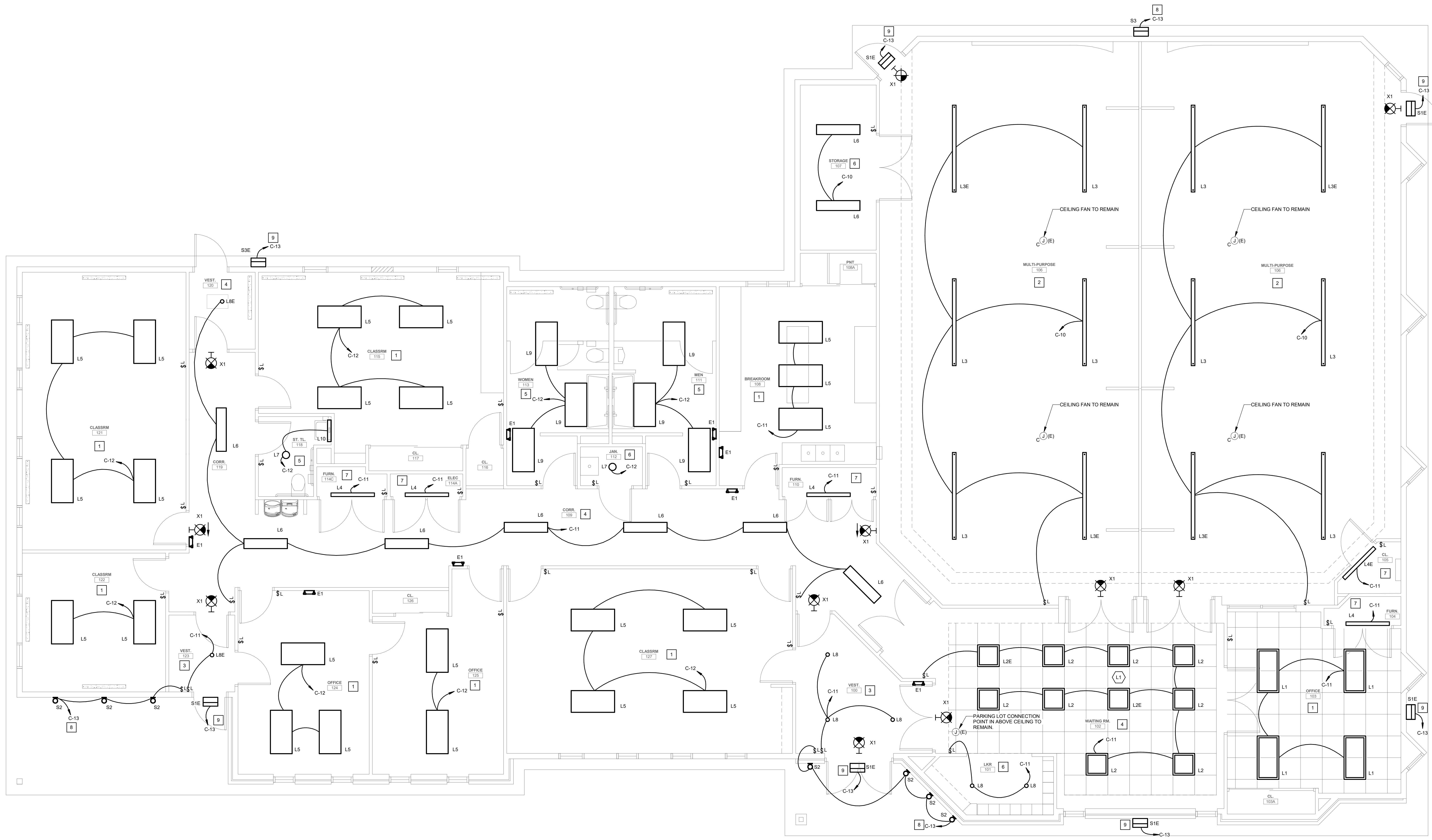
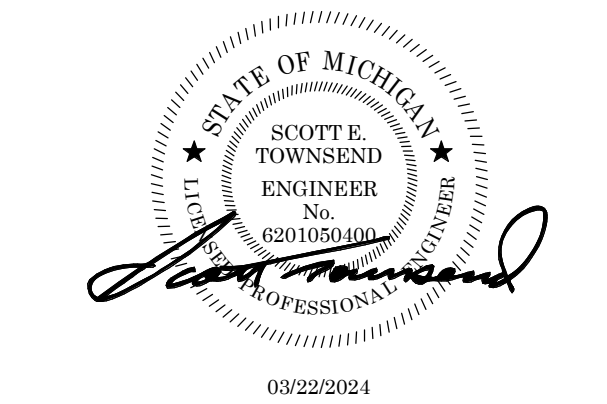


LIGHTING KEYNOTES

L1 CEILING TILES IN THIS AREA SHALL BE RE-ARRANGED TO MATCH NEW LIGHTING LAYOUT.

LIGHTING GENERAL NOTES

1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF ALL LIGHTING FIXTURES UNLESS OTHERWISE NOTED.
2. EXIT LIGHTS AND EMERGENCY BATTERY UNITS SHALL BE UNCONTROLLED AND TIED AHEAD OF LOCAL AREA LIGHTING SWITCH, UNLESS CIRCUITED OTHERWISE.
3. WHERE MORE THAN ONE LIGHT SWITCH IS INDICATED TO BE INSTALLED AT THE SAME LOCATION, THEY SHALL BE GROUPED UNDER ONE COMMON FACEPLATE.
4. ALL POWER PACKS TO BE LOCATED DIRECTLY ABOVE SWITCH.
5. LIGHT FIXTURES ARE LOOPED TOGETHER TO INDICATE CONTROL ZONE GROUPS. CONNECTED FIXTURES ARE TO BE CONTROLLED TOGETHER. CIRCUITS MAY BE SHARED AMONG SEPARATE CONTROL ZONE GROUPS. MULTIPLE ZONES MAY BE COMBINED IN SOFTWARE TO FORM SCENES. SEE LIGHTING CONTROL MATRIX, SCENE SCHEDULE (IF PROVIDED), AND PANEL SCHEDULES FOR ADDITIONAL INFORMATION.
6. ALL CONDUITS SHALL BE ROUTED CONCEALED UNLESS NOTED OTHERWISE.



FIRST FLOOR LIGHTING PLAN
SCALE: 1/4" = 1'-0"

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