September 20, 2023

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

October 12, 2023, 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-1790 Attwood Elementary Cafeteria Addition

BID DOCUMENTS WILL BE POSTED BY September 25, 2023

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 12:00 PM on Thursday, October 5, 2023. 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 Tuesday, October 3, 2023 at 4:00 PM at Attwood Elementary 915 Attwood Dr. Lansing, MI 48911. Attendance is HIGHLY RECOMMENDED.

LAUX CONSTRUCTION

Lansing School District

Attwood Elementary

Cafeteria Addition

SO-1790

CM Project 23064

915 Attwood Dr.

Lansing, MI 48911

Bid Package 1

September 18, 2023

PROJECT MANUAL

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- WC 22A Plumbing
- WC 23A HVAC
- WC 26A Electrical
- WC 31A Sitework

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

Director: Chris Martin
517-694-0117
chris@lauxconstruction.com

Project Manager: Brian Stiebe
517-694-0117
brian@lauxconstruction.com

Assistant PM: Jessica Quinn
517-694-0117
jessica@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, October 12, 2023** 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 "Attwood Elementary Cafeteria Addition—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, October 12, 2023.**

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/Bergmann on October 13, 16, and 17 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 Thursday, October 5, 2023**. 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 **4:00 pm local time on Tuesday, October 3, 2023** at the project site, located at 915 Attwood 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 Bergmann Associates 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 September 18, 2023.

B. Project Manual (General Requirements and Technical Specifications) by Bergmann, dated September 18, 2023.

C. Drawings by Bergmann, dated September 18, 2023

END OF DOCUMENT

DOCUMENT 00 41 00 - BID FORM

DATE	October 12, 2023 2:00 pm
PROJECT	**Attwood Elementary-Cafeteria Addition** **Bid Package 1** **SO-1790**
OWNER	Lansing School District
DESIGN PROFESSIONAL	Bergmann
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 upon approval of their recommendation by the Lansing School District.

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. Performance & Payment Bonds: Add the following amount should 100% P & P bonds be required by the construction manager:

$_____

C. Alternate Bids (Do not include cost of bonds in alternate total):

- NOT USED

D. Unit Prices:

- **WC 06A General Trades**: Cost, per man-hour (reg time), for laborer:

  $_____/man-hour

- **WC 06A General Trades**: Cost, per man-hour (reg time), for carpenter:

  $_____/man-hour

1.3 TIME FOR PERFORMANCE OF WORK

A. All work related to the cafeteria is to be substantially complete and ready for occupancy no later than November 29, 2024.
B. All work related to the parking lot and bus loop is to be substantially complete prior to the start of 2024-25 school year.

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 _____

BIDDING/ESTIMATOR CONTACT:

Name_____ Phone:_____

Email Address:_____

PROPOSED PROJECT MANAGER:

Name_____ Phone:_____

Email Address:_____

END OF DOCUMENT

PURFR016 – 7/7/08 – Version 5

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)

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 **☐Individual ☐Partnership ☐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.

☐ Do you require a hard copy of verbal orders? Yes ____ No _____ Do you accept Procurement Cards? Yes _____ No _____

☐ Electronic Disk Catalog ☐ 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

NAICS CODE ***DESCRIPTION***

____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 I 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	December 2, 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 gender 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.

Definitions:

Words used in this policy shall have those meanings defined herein; words not defined herein shall be construed according to their plain and ordinary meanings.

Race is inclusive of traits historically associated with race, including, but not limited to, hair texture and protective hairstyles. For purposes of this definition, "protective hairstyles" includes, but is not limited to, such hairstyles as braids, locks, and twists.

Complainant is the individual who alleges, or is alleged, to have been subjected to unlawful discrimination/retaliation, regardless of whether the person files a formal complaint or is pursuing an informal resolution to the alleged discrimination/retaliation.

Respondent is the individual who has been alleged to have engaged in unlawful discrimination/retaliation, regardless of whether the Reporting Party files a formal complaint or is seeking an informal resolution to the alleged discrimination/retaliation.

School District community means students and Board employees (i.e., administrators, and professional and classified staff), as well as Board members, agents, volunteers, contractors, or other persons subject to the control and supervision of the Board.

Third Parties include, but are not limited to, guests and/or visitors on School District property (e.g., visiting speakers, participants on opposing athletic teams, parents), vendors doing business with, or seeking to do business with, the Board, and other individuals who come in contact with members of the School District community at school-related events/activities (whether on or off District property).

Day(s): Unless expressly stated otherwise, the term "day" or "days" as used in this policy means a business day(s) (i.e., a day(s) that the Board office is open for normal operating hours, Monday - Friday, excluding State-recognized holidays).

For purposes of this policy, "military status" refers to a person's status in the uniformed services, which includes the performance of duty, on a voluntary basis, or involuntary basis, in a uniformed service including active duty, active duty for training, initial active duty for training, inactive duty for training, full-time National Guard duty. It also includes the period of time for which a person is absent from employment for the purpose of an examination to determine the fitness of the person to perform any such duty as listed above.

District Compliance Officers

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

Michael Jones

Title IX Coordinator
517-755-2832
519 W Kalamazoo
Lansing, MI 48933
michael.jones@lansingschools.net

Unaa Holiness
Human Resources Manager
517-755-2010
519 W Kalamazoo
Lansing, MI 48933
unaa.holiness@lansingschools.net

The names, titles, and contact information of these individuals will be published annually on the School District's web site and in the staff handbooks and in the School District Annual Report to the public

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, 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. A copy of each of the Acts and regulations on which this notice is available upon request from the CO.

Reports and Complaints of Unlawful Discrimination and Retaliation

Employees are required to 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 official who receives such a report shall file it with the CO within two (2) 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 Complainant'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 reports of unlawful discrimination/retaliation directly from any member of the School District community or a Third Party, or received reports that are initially filed with another Board employee. Upon receipt of a report of alleged discrimination/retaliation, the CO will contact the Complainant and begin either an informal or formal complaint process (depending on the Complainant's request and 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 the Complainant and the Respondent. 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 Complainant within two (2) business days to advise of the Board's intent to investigate the alleged wrongdoing.

Investigation and Complaint Procedure (See Form 3122 F2)

Except for sex discrimination and/or Sexual Harassment that is covered by Policy 2266 - Nondiscrimination on the Basis of Sex in Education Programs or Activities, any employee who alleges to have been subjected to unlawful discrimination or retaliation may seek resolution of the complaint through the procedures described below. The formal complaint procedures involve an investigation of the individual’s claims of discrimination/retaliation 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 are encouraged to file a complaint within thirty (30) 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 promptly 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 alleges unlawful discrimination or retaliation. 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 Complainant and the Respondent mutually agree to participate in it.

The Complainant may proceed immediately to the formal complaint process and individuals who participate in 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 and a student will be formally investigated.

As an initial course of action, if a Complainant feels comfortable and safe doing so, the individual should tell or otherwise inform the Respondent that the allegedly discriminatory/retaliatory conduct that it is inappropriate and must stop. The Complainant should address the alleged misconduct as soon after it occurs as possible. The COs are available to support and counsel the Complainant when taking this initial step or to intervene on behalf of the individual if requested to do so. A Complainant who is uncomfortable or unwilling to directly approach the Respondent about the inappropriate conduct may file an informal or a formal complaint. In addition, with regard to certain types of unlawful discrimination (e.g., sex discrimination), the CO may advise against the use of the informal complaint process.

A Complainant who alleges unlawful discrimination/retaliation 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 the Complainant 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 Complainant, informal resolution may involve, but not be limited to, one or more of the following:

A. Advising the Complainant about how to communicate concerns to the Respondent.

B. Distributing a copy of Policy 3122 – Non-Discrimination and Equal Employment Opportunity to the individuals in the school building or office where the Respondent works.

C. If both parties agree, the CO may arrange and facilitate a meeting or mediation between the Complainant and the Respondent 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 is directed to attempt to resolve all informal complaints within fifteen (15) business days of receiving the informal complaint. If the Complainant is dissatisfied with the informal complaint process, the Complainant may proceed to file a formal complaint and, as stated above, either party 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 Complainant, from the outset, elects to file a formal complaint, or the Compliance Officer(s) determines the allegations are not appropriate for resolution through the informal process, the formal complaint process shall be implemented.

A Complainant may file a formal complaint, either orally or in writing, with a principal, the CO, Superintendent, or other District official. 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 formal complaint within thirty (30) days after the conduct occurs. If a Complainant informs a principal, Superintendent, or other District official, either orally or in writing, about any complaint of discrimination/retaliation, that employee must report such information to the CO/designee within two (2) business days.

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

All formal complaints must include the following information to the extent known: the identity of the Respondent; a detailed description of the facts upon which the complaint is based (i.e., when, where, and what occurred); 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 Respondent. In making such a determination, the CO should consult the Complainant to assess whether the individual agrees with the proposed action. If the Complainant is unwilling to consent to the proposed change, the CO may still take whatever actions deemed 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 Respondent that a formal 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 and Equal Employment Opportunity. The Respondent must also be informed of the opportunity to submit a written response to the formal complaint within five (5) 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/designee shall prepare and deliver a written report to the Superintendent that summarizes the evidence gathered during the investigation and provides 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 Respondent has engaged in unlawful harassment/retaliation of the Complainant. 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 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 written 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 Respondent engaged in unlawful discrimination/retaliation toward the Complainant, the Superintendent 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 Board reserves the right to investigate and resolve a complaint or report of unlawful discrimination/retaliation regardless of whether the employee alleging the unlawful discrimination/retaliation 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, the filing of charges with local law enforcement, or the filing of a civil action in court. Use of this internal complaint process is not a prerequisite to the pursuit of other remedies.

Privacy/Confidentiality

The 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. Additionally, the Respondent must be provided the Complainant's identity.

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 is learned or provided during the course of the investigation.

Sanctions and Monitoring

The Board shall vigorously enforce its prohibitions against unlawful discrimination/retaliation 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 harassment/retaliation or participates as a witness in an investigation is prohibited. Neither the Board nor any other person may intimidate, threaten, coerce 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 report, formal complaint, testified, assisted or participated or refused to participate in any manner in an investigation, proceeding, or hearing under those laws and/or this policy, 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 and/or this policy.

Retaliation against a person for making a report of discrimination, filing a formal complaint, or participating in an investigation or meeting is a serious violation of this policy that can result in imposition of disciplinary sanctions/consequences and/or other appropriate remedies.

Formal complaints alleging retaliation may be filed according to the internal complaint process set forth above.

The exercise of rights protected under the First Amendment of the United States Constitution does not constitute retaliation prohibited under this policy.

Education and Training

In support of this policy, the Board promotes preventative educational measures to create greater awareness of unlawful discriminatory practices. The Superintendent 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

The Compliance Officer(s) is responsible for overseeing retention of all records that must be maintained pursuant to this policy. 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 or individuals contracted or appointed by the Board to fulfill its responsibilities 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 supportive measures offered and/or provided to the Complainant and/or Respondent, 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 Codes of Conduct and/or Employee Handbooks);

M. copies of any documentation that memorializes any formal or informal resolutions to the alleged discrimination or harassment.

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., 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.

Carol Morey Viventi

Secretary of the Senate

Gary L. Randall

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. Theses 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 SPECIFED:**

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

10. **ROYALATIES 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 taxed 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 evident 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 of 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 discriminated against any employee or applicant for employment, to be employed in t 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

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.

policy

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.

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.

policy

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.

policy

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

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;

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.

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

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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

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

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policy

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

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

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

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.

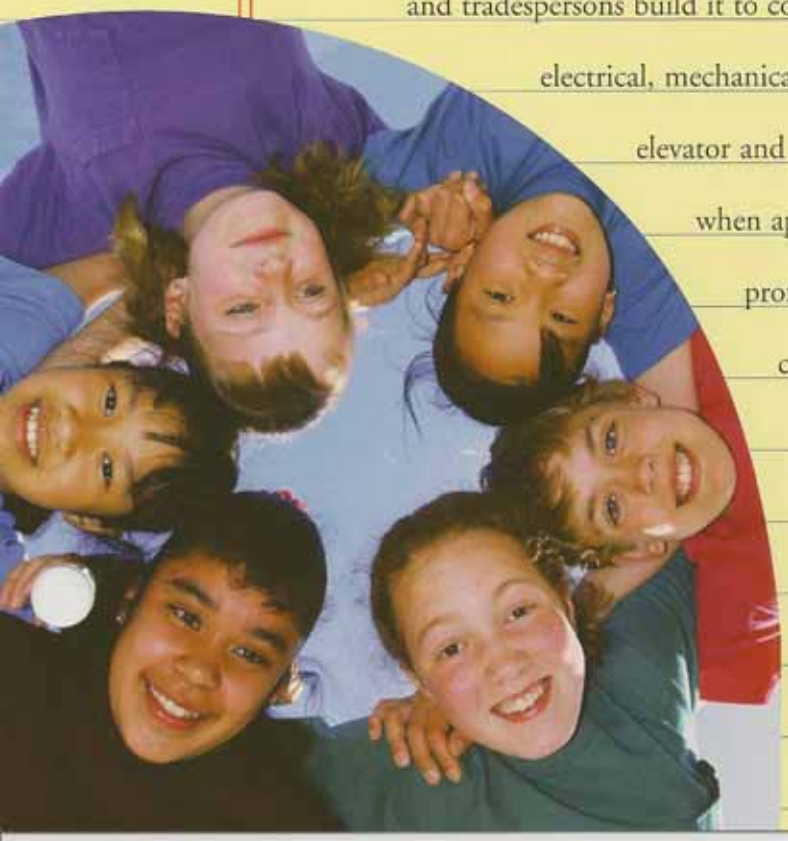
PREVAILING WAGE. Use of prevailing wage requirements ensures that school boards secure the best qualified construction professionals to perform work on their projects. Construction professionals should compete for projects on the basis of their management practices, not by paying sub-standard wages. 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 can only be utilized at the owner's discretion and written authorization.

- **Work Category 06A—General Trades**

  Allowance #1: $10,000 for cleaning of undefinable debris.
  Allowance #2: $20,000 for CM contingency.

- **Work Category 31A—Sitework**

  Allowance #1: $10,000 for CM contingency.

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 06A—General Trades**

  Unit Price #1: Cost, per man-hour (reg time), for laborer.
  Unit Price #2: Cost, per man-hour (reg time), for carpenter.

1.3 ALTERNATES

A. Alternates: The following mandatory bid alternates are to be provided:

NOT USED

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 estimating@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 estimating@lauxconstruction.com

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 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. SOV must provide a separate breakdowns for each cabin. Any trades that have work associated with the dorm will also need to break out those costs.
   3. When payment is requested for stored materials, break down value into cost of materials and total installed value.
   4. 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

FROM: _____

ATTENTION: Chris Martin estimating@lauxconstruction.com

PROJECT: **Attwood Elementary-Cafeteria Addition**
Bid Package 1
SO-1790

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 _____

END OF SECTION

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 Fence and Barricades: Laux Construction will provide and install temporary fencing and barricading unless noted otherwise in WC descriptions.

C. Dumpsters: Laux Construction will place a container(s) on site for disposal of all debris generated by construction activities.

D. Temporary Sanitary Facilities: Laux Construction will provide temporary sanitary facilities throughout the duration of the project. Use of existing restroom facilities inside of building during construction will not be permitted.

E. Temporary Electricity: Connect to existing electrical system. Cost of electricity will be paid for by Owner. Temporary power will be established by the EC.

F. Temporary Water: Use existing water source for construction operations. Costs of water used will be paid for by Owner.

G. Temporary Lighting: Temporary lighting will be provided by the EC. Lighting, to meet MiOSHA standards, will be provided in each interior space during construction.

H. Temporary Heat: Use of permanent HVAC equipment for conditioning of space will not be permitted until primer/first coat of paint has been applied. Any temporary heat sources during construction will be paid for by the CM on an as-needed basis. Trade contractors are to obtain authorization from Laux construction prior to implementing these measures and are to provide a detailed accounting of all costs associated with them as requested by Laux Construction.

I. Temporary Ventilation: Ventilate areas to facilitate curing of materials, disperse humidity, and prevent accumulations of dust, fumes, vapors, or gases. Each work category will be responsible for providing means of ventilation during the course of their work.

J. 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. WC 31A

B. Erosion and Sediment Control: Provide temporary measures including silt fences, dikes, berms, settlement basins, and drainage systems to prevent water flow and sedimentation. WC 31A

C. Dust Control: Minimize dust from construction operations. Prevent dust from dispersing into atmosphere. Each WC is responsible for dust control and mitigation during the course of their work.

D. Mold and Mildew Control (All WC's):
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.

E. Protection of Existing Finishes: Protect surrounding finishes from effects of construction activities. Each trade contractor is responsible for protection measures for their own work.

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

Extents of Work

- Construction of addition to south side of existing building to be used for cafeteria and gymnasium.
- Construction of new bus loop on the north side of the property and associated drainage.
- Construction of new dumpster enclosure on south end of parking lot.

Comprehensive Work Scope

- Each work category is to provide all labor, materials, tools, and equipment necessary to complete their scope of work, including any incidental items that may not explicitly be shown on the plans.
- All work is to be installed according to the manufacturers' recommendations so as to not void any warranties.
- Each work category is responsible for determining the means and methods of installation of their respective work. The means and methods must be safe and consistent with MiOSHA standards and not adversely affect the site or work of other work categories.

Schedule

- Work will begin at the end of the 2023-24 school year (early June 2024).
- Sitework related to the bus loop and parking lot to be completed prior to start of school in August, 2024.
- To meet egress requirements, building must be erected, roofing installed, and concrete floor slab in place prior to start of school in August, 2024.
- All work is to be complete and building ready for occupancy no later than November 29, 2024.
- A detailed construction schedule will be developed after selection and award of trade contracts. Successful bidders will be expected to meet with Laux Construction at a time and place to be determined to review lead times and work durations in preparation for schedule.

Work by Others

- The construction manager will provide the following:
    - Soils and materials testing
    - Temporary construction fencing
    - All dumpsters for debris generated by construction activities.
    - Temporary Fire Extinguishers
    - Outhouse
    - Building permit from SOM Bureau of Construction Codes
    - Final cleaning

- The following work will be provided by the owner under a separate contract:
  - Furnish underground stormwater detention system materials
  - Furnish pre-cast MH #7

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 work category 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. The CM will NOT be responsible for overseeing or coordinating 2nd/3rd tier subcontractors.

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.
- All contractors will be responsible for submitting hard copies and an electronic copy of Safety Data Sheets for all materials used on the project PRIOR TO STARTING THEIR WORK.

Schedule

- With the input of the trade contractors, the CM will issue a detailed baseline schedule prior to the start of the project.
- The CM will distribute three-week look ahead schedules on a weekly basis detailing the schedule for all upcoming tasks during that period.
- Trade contractors are expected to provide adequate manpower, work hours, and tools/equipment necessary to meet the schedules.
- Should a trade contractor not meet their schedule obligations, the CM will issue ONE warning and request a written recovery plan from that subcontractor which will be submitted within 24 hours of the warning. Should the trade contractor not provide a recovery plan or successfully implement the recovery plan, the CM will supplement their work force/resources in order to meet the project schedule set forth. All costs incurred by the CM will be at the expense of the trade contractor in default and will be deducted from their contract in a change order.

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.
- Each trade is responsible for protecting surrounding finishes, fixtures, etc. from dust, debris, and damages during the course of their work.
- All trades are to provide regular cleanup of debris generated by their work (definable). Debris to be placed in a dumpster on site provided by the construction manager.
- WC 06A 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 deducted from the contract of the WC responsible for the debris on a change order.

Conduct

- No tobacco products will be allowed on the premises, including chewing tobacco, cannabis, vaping, e-cigarettes, cigarettes, or cigars.
- 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.
- There is to be no food or drink inside of the building.
- There is to be no interaction between contractors and LSD or Bergmann staff members unless facilitated by Laux Construction.

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.
- All work category contractors whose work requires field verification of dimensions and/or site conditions will be required to provide their own field verifications.
- 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 should submittals not have been provided by the trade contractor.
- 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 in writing via email or 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 work category is to be in attendance at each progress meeting and be prepared to discuss status of material deliveries, schedule, coordination with other trades, etc. Should a contractor not be able to attend a progress meeting, a written notification is to be forwarded to the CM at least 24 hours prior to the meeting.

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

Work Category 03A: Building Concrete

Sections Included:

- 031000 Concrete Forming and Accessories
- 032000 Concrete Reinforcing
- 033000 Cast-in-Place Concrete
- 033543 Polished Concrete Finishing
- 071113 Bituminous Dampproofing
- 072100 Thermal Insulation (partial scope only)
- 079200 Joint Sealants (related to concrete only)

Specific Notes/Scope:

1. Subbase will be furnished, installed, and graded to within +/-.10' by WC 31A. This WC to perform any fine grading required prior to installation of their work.
2. Construct concrete building footings and foundation walls.
3. Provide and install all concrete reinforcement.
4. Drill and install dowels into existing concrete footings and connect to new footings.
5. Construct column footings.
6. Apply damp proofing to face of concrete foundation walls where noted.
7. Furnish and install all vertical and horizontal rigid insulation around perimeter of addition. Coordinate with backfill by WC 31A.
8. Furnish and install vapor barrier under building slab.
9. Construct interior building slabs with troweled finish. Sawcut control joints.
10. Construct frost stoop foundation walls and stoop slabs @ exterior entrances.
11. Furnish and install joint sealants associated with work performed under this scope.
12. Construction/control joints as detailed on plans.
13. Provide means of transporting concrete to all areas of building and site as necessary.
14. Receive and install any imbedded items provided by WC 05A (ie, anchor bolts, etc.).
15. Install non-shrink grout under steel columns.
16. Upon completion of floor slab, third-party testing firm will review flatness of floor for compliance with documents. Any major floor prep required due to floor being out of specified tolerances will be at the expense of this work category.

Exclusions/Work by Others:

1. Cold weather concrete costs.
2. Patching of concrete floor slab where removed to install UG plumbing (by WC 22A)
3. Surveying/layout/staking with offsets (by WC 31A)

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 04A: Masonry

Sections Included:

- 024119 Selective Demolition (partial scope)
- 042000 Unit Masonry
- 071113 Bituminous Dampproofing
- 079200 Joint Sealants (related to masonry only)

Specific Notes/Scope:

1. Construct 5' x 5' (min) mockup on site for verification of block and mortar materials to be used on the project.
2. Receive bearing plates from WC 05A and set and grout in place.
3. Receive steel lintels from WC 05A and set in place.
4. Fill voids @ ends of beams with grout.
5. WC 06A will provide demolition of new openings at existing building. Provide misc. demolition required to tooth opening. Tooth and patch CMU as necessary at openings.
6. Provide patching of masonry where intersecting masonry walls are removed. Field verify if intersecting walls are butted to each other or interlocked together prior to bidding.
7. Furnish and install all CMU and related mortar, grout, and reinforcement.
8. Infill and tooth in existing window and door openings.
9. Apply dampproofing to face of CMU.
10. Furnish and install all through wall flashing, termination bars, related sealants, and weeps.
11. Clean masonry upon completion of work.
12. Coordinate with WC 06A to set frames in masonry openings. This WC to grout frames in masonry openings.
13. Provide all scaffolding and lifts to reach work.
14. Provide bracing of masonry walls during construction.
15. Provide site specific safety and logistics plan related to construction of masonry walls.
16. Coordinate with shop drawings of other WC's for sizing and placement of openings.
17. Furnish and install any joint sealants between similar materials (masonry-to-masonry).
18. Dispose of all masonry materials in designated dumpster provided by CM.

Exclusions/Work by Others:

1. Steel imbeds (by WC 05A)
2. Rigid insulation (by WC 06A)
3. Joint sealants between dissimilar materials (ie, masonry to aluminum frames, etc.)
4. Winter conditions. These will be paid for on an as-needed basis.

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 05A: Steel

Sections Included:

- 051200 Structural Steel Framing
- 052100 Steel Joist Framing
- 053100 Steel Decking
- 054000 Metal Fabrications

Specific Notes/Scope:

1. Provide detailed shop drawings of all structural members and connections.
2. Furnish and turn over any items to be imbedded in concrete or masonry to WC 03A or 04A for installation. Coordinate location and placement of imbedded items with those WC's. Provide templates for setting of anchor bolts for columns.
3. Furnish and install anchor rods/bolts for connection of structural steel to foundations.
4. Furnish and install bearing plates.
5. Furnish and install all structural steel, including columns, beams, joists, deck, lintels, and angles.
6. Furnish and install roof ladder.
7. Coordinate with WC 06A for bracing requirements for basketball backboards.
8. Coordinate with WC 23A for bracing/support and duct penetration requirements for RTU's.
9. Furnish and deliver steel bollard posts for dumpster enclosure. WC 31A to receive and install.
10. Furnish steel gates for dumpster enclosure as follows:
    a. WC 05A to furnish tube steel columns for attachment of gates. WC 31A to excavate and set in place with concrete. This WC to coordinate with WC 31A and 06A for placement.
    b. WC 05A to design, fabricate, and install steel gate frame assembly, including hinges, perimeter frame, cane bolts/pulls, and casters. Coordinate installation with 31A and 06A.
11. Provide all welded and mechanical connections related to this scope of work.
12. Provide means of unloading and hoisting/setting all materials provided by this WC.
13. Provide lifts and/or scaffolding to reach work installed by this category.

Exclusions/Work by Others:

1. Cold-formed metal framing and connectors (WC 06A)

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 06A: General Trades

Sections Included:

- 024119 Selective Demolition
- 054000 Cold-Formed Metal Framing
- 061053 Miscellaneous Rough Carpentry
- 072100 Thermal Insulation
- 072200 Nailbase Insulation Panels
- 072500 Weather Barriers
- 074213.23 Metal Composite Material Wall Panels
- 079200 Joint Sealants (Partial Scope)
- 081113 Hollow Metal Doors and Frames
- 083113 Access Doors and Frames
- 087100 Door Hardware (Partial Scope)
- 092216 Non-Structural Metal Framing
- 092900 Gypsum Board
- 098436 Sound-Absorbing Ceiling Units
- 104413 Fire Protection Cabinets
- 104416 Fire Extinguishers
- 116623 Gymnasium Equipment

Specific Notes/Scope:

1. Construct temporary, weathertight and secure partition across gymnasium approximately 20' to the north of the south wall. Furnish and install ¼" Masonite floor protection in south section of gym to protect floor during construction and for staging of tools/equipment. Install one door with lockset and construction core for access through partition.
2. Perform selective demolition as follows:
    a. Minor demolition to separate existing canopy from building and coordinate with WC 31A for removal of canopy and related foundations.
    b. Remove portion of roof and soffit overhang above canopy area in preparation for new addition. Provide temporary measures to keep existing weathertight once removed.
    c. Doors and frames scheduled to be removed. Coordinate with CM for salvage of any doors/hardware and turn over to LSD.
    d. Existing exterior storage structure walls. Prior to bidding, field verify if masonry butts up to existing building to remain or is interlocked with existing masonry.
    e. Demo walls to create new openings. WC 04A will provide minor demo @ areas to be toothed in. This WC to provide all temporary measures to secure and keep openings weathertight.
    f. Windows
    g. Shelving

3. Furnish and install all cold-formed metal framing. Include all costs for delegated design by structural engineer licensed in the State of Michigan.
4. Furnish and install all wood roof and parapet blocking.
5. Furnish and install all wood blocking at window and door openings.
6. Furnish and install any wood backer panels for electrical work.
7. Furnish and install all wood blocking @ RTU curbs.
8. Furnish and install all light gauge metal framing.
9. Furnish and install all batt insulation located in metal framing cavities.
10. Furnish and install nailbase insulation on the face of CMU walls.
11. Furnish and install all weather barriers.
12. Furnish and install metal composite wall panels, fascia, soffit, trims, accessories, and related joint sealants.
13. Furnish and install hollow metal doors and frames.
14. Patch holes in HM frames used for grouting with filler material (ie, Bondo). Sand smooth.
15. Furnish and install hardware for HM doors. Provide cores and turn over to CM for keying by LSD's lock shop.
16. Coordinate with WC 26A for installation of access controls.
17. Furnish and install all access doors.
18. Hang, tape, finish, and sand all gypsum board.
19. Furnish and install any acoustical sealants.
20. Protect all surrounding finishes during finishing operations. Provide measures to prevent the spread of dust during sanding operations.
21. Upon completion of sanding activities, perform a thorough cleaning of all dust and debris generated by drywall scope. Vacuum dust from all surfaces utilizing a HEPA filter vac. Scrape and clean finishing compound from all surfaces. Excessive compound left on surfaces that requires additional preparation for new finishes will be the responsibility of this WC.
22. Touch up gypsum board surfaces after priming activities are completed by WC 09B.
23. Furnish and install sound absorbing ceiling baffles.
24. Remove and reinstall existing ceiling in corridor to allow WC 22A access to tie in water supply piping.
25. Remove and reinstall existing ceiling in corridor to allow WC 23A access to tie in hot water piping for new CUH's.
26. Furnish and install fire protection cabinets and fire extinguishers.
27. Furnish and install all gymnasium equipment (basketball, volleyball, and safety pads)
28. Furnish and install all composite posts and panels for dumpster enclosure. Layout posts and coordinate installation of work with WC 31A and 05A. WC 31A will auger and pour concrete for posts foundation. This WC to layout post locations and set posts. WC 05A will fabricate steel gate frame, including bolts, pulls, and casters.
29. Furnish and install safety yellow plastic bollard sleeves over steel bollards located at dumpster enclosure.
30. Furnish and install basketball backboards, hoops, nets, and posts, including excavation and concrete foundations at the playground area per Sheet C200, note N.
31. Remove and relocate existing flag pole. Document current condition with CM prior to work. See C100.
32. Provide regular clean up of all debris generated by this WC. Dispose of debris in dumpster provided by CM.

Exclusions/Work by Others:

1. Demo of canopy, supports, and foundation (by WC 31A)
2. Demo of storage structure foundations or floor slab (by WC 31A)
3. Furnish and install dampproofing over face of concrete foundation walls subgrade rigid insulation (by WC 03A)
4. Excavation and concrete for dumpster enclosure posts (by WC 31A)
5. Furnish and install dampproofing over face of masonry walls (by WC 04A)
6. Grouting of HM frames in masonry openings (by WC 04A)
7. Dumpster enclosure gate steel/posts and bollards (by WC 05A)
8. Roof insulation (by WC 07A)
9. Hardware for aluminum and FRP doors (by WC 08A)
10. Perimeter caulking of aluminum frames and metal curtain wall (by WC 08A)
11. Glazing in HM frames (by WC 08A)
12. Keying of lock cores (by LSD)
13. Caulking of HM frames (by WC 09B)
14. Sawcut and removal of floor slab for MEP work (by WC 22)
15. Penetration firestopping (by WC 22A, 23A, and 26A)
16. Access controls (by WC 26A)

Allowances:

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

1. Cleaning Allowance: This WC to include an allowance of **$10,000** for undefinable cleaning during construction as directed by the construction manager. This WC to provide hourly rate (regular time) to be used for billing of cleaning laborer (see unit prices).

2. CM Contingency Allowance: This WC to include an allowance of **$20,000** to be used as directed by the construction manager.

Alternates:

1. NOT USED

Unit Prices:

1. Provide cost, per man-hour (regular time), for laborer to perform clean-up of undefinable debris throughout the duration of the project. This hourly amount will be used as a basis for billing against the cleaning allowance as well as the contingency allowance.

2. Provide cost, per man-hour (regular time), for carpenter to perform any additional work. This hourly amount will be used as a basis for billing against the contingency allowance.

END OF WORK CATEGORY

Work Category 07A: Roofing

Sections Included:

- 072100 Thermal Insulation (partial scope)
- 075323 Ethylene-Propylene-Diene-Monomer (EPDM) Roofing
- 077100 Roof Specialties
- 077129 Manufactured Roof Expansion Joints

Specific Notes/Scope:

1. Provide materials as specified. No substitutions will be permitted.
2. Provide means of hoisting materials to roof surface.
3. Coordinate with WC 06A for demo of existing roof structure. This WC to cut back existing roof covering.
4. Furnish and install rigid insulation over roof deck.
5. Furnish and install pre-finished metal copings.
6. Flash all penetrations in roof per roofing manufacturer's requirements.
7. Provide all labor and materials necessary to tie flashing from new parapet into existing roof.
8. Furnish and install all roof expansion joints.
9. Provide flashing of gas piping that penetrates roof in existing building. See Sheet M101.
10. Provide flashing of electrical conduit that penetrates roof in existing building. See Sheet E101.
11. Provide flashing of RTU roof curb.

Exclusions/Work by Others:

1. Wood roof/parapet blocking (by WC 06A)
2. Rigid insulation on vertical wall surfaces (by WC 06A)
3. Metal wall panels, fascia, and soffit (by WC 06A)

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 08A: Glazing

Sections Included:

- 079200 Joint Sealants (partial scope)
- 081613 Fiberglass Reinforced Polyester (FRP) Doors and Frames
- 084113 Aluminum-Framed Entrances and Storefronts
- 084418 Glazed Steel Curtain Wall
- 084523 Fiberglass-Sandwich-Panel Assemblies
- 087100 Door Hardware (partial scope)
- 088000 Glazing

Specific Notes/Scope:

1. Furnish and install aluminum entrances and storefronts.
2. Furnish and install FRP doors.
3. Furnish and install door hardware associated with aluminum entrances and FRP doors only. Turn over cores to CM for keying by LSD's lock shop.
4. Coordinate with WC 26A for installation of access controls.
5. Furnish and install glazed steel curtain wall system.
6. Furnish and install fiberglass-sandwich-panel assemblies by Kalwall or Major Industries, Inc. Include design by engineer licensed in the State of Michigan.
7. Coordinate with testing firm contracted by CM to perform water-spray tests.
8. Perform interior and exterior perimeter caulking of all frames furnished and installed by this WC.
9. Furnish and install all glazing, including glass located in hollow metal doors and frames.

Exclusions/Work by Others:

1. Keying of lock cores (by LSD)
2. Hardware associated with hollow metal doors (by WC 06A)
3. Door lite kits in HM doors (by WC 06A)
4. Wood blocking at window and door openings (by WC 06A)
5. 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 09A: Floor Coverings

Sections Included:

- 096513 Resilient Base and Accessories
- 096566 Resilient Athletic Flooring
- 124813 Entrance Floor Mats & Frames

Specific Notes/Scope:

1. Perform minor preparation of floor slab, as required by manufacturers' recommendations. Floor flatness will be evaluated upon completion of floor slab. Coordinate with CM and WC 03A to determine if any floor prep beyond the requirements of the flatness level as described int eh concrete specifications will be necessary. Should any major floor prep be required, work is to be performed prior construction of any interior walls.
2. Evaluate condition of the floor slab at least one week prior to the start of work performed by this WC (moisture content, cleanliness, etc.). Confirm acceptance and/or notify CM of any issues or concerns with the state of the floor slab. This WC accepts condition of the floor slab once work related to flooring scope begins.
3. Deliver materials and allow them to acclimate to space as required by manufacturer. Coordinate with CM to provide adequate atmosphere inside of building.
4. Furnish and install resilient base.
5. Furnish and install resilient athletic flooring.
6. Layout and apply gymnasium floor markings.
7. Furnish and install entrance floor mats and frames.
8. Furnish and install all required transition trims.
9. Patch existing floor finish to match where removed in corridor to tie in sanitary piping. Refer to Sheet P101. Field verify flooring finish type prior to bidding.

Exclusions/Work by Others:

1. Final cleaning (by CM).

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 09B: Painting

Sections Included:

- 079200 Joint Sealants (partial scope)
- 099123 Interior Painting

Specific Notes/Scope:

1. Provide draw down samples for verification of paint colors prior to start of work.
2. Install temporary protection over all surrounding surfaces and protect them from paint drips/spatter/overspray throughout all painting activities.
3. After application of primer over gypsum board, this WC is to inspect drywall surfaces and notify CM of any areas of concerns (ie, defects, rough areas, dents, etc). WC 06A will patch and sand these areas ONE TIME. Once the first finish coat of paint is applied, that surface is considered acceptable by this WC and is responsible for any pre-existing defects.
4. Caulk perimeter frames prior to painting.
5. This WC is responsible for caulking any joints between gypsum board and masonry/steel.
6. Prime and apply two coats of paint to gypsum board surfaces.
7. Apply two coats of paint to hollow metal doors and frames.
8. Apply two coats of paint to all exposed steel members, including columns, beams, angles, deck, etc.
9. Paint all exposed ductwork, conduit, and piping.
10. Paint exposed cast iron gas piping, including piping from existing boiler room, across roof, to new RTU.
11. Final coat of paint applied to gypsum board and HM doors and frames to be performed at the end of the project. Application of both coats consecutively while other construction activities are in progress will not be permitted. A return trip for final coat at these areas will be required.

Exclusions/Work by Others:

1. NOT USED

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 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)
- Div 22 Refer to "P" Drawings

Specific Notes/Scope:

1. Provide plumbing permit and inspections by SOM BCC.
2. Field verify location of existing sanitary in corridor prior to start of work.
3. Sawcut and remove concrete from corridor 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.
4. Install UG sanitary piping and tie into existing, including all excavation, backfill, and compaction of soils. Assume that existing soils are suitable for backfill.
5. Patch concrete slab where removed to install UG piping. Coordinate with WC 09A prior to placement of concrete.
6. Install new UG storm piping in addition area and stub 5' outside of building for connection by WC 31A. Include all excavation, backfill, and compaction necessary for installation of UG piping.
7. Provide all investigations, labor, and materials necessary for temporary roof drainage prior to demolition of existing. See Sheet AD101.
8. Demo existing plumbing fixtures and piping.
9. Furnish and install roof/overflow drains and associated piping. Coordinate installation of roof drains with WC 07A.
10. Furnish and install plumbing vents. Coordinate installation of vents with WC 07A.
11. Furnish and install electric water cooler and all water supply piping. Connect to existing piping above ceiling in corridor. WC 06A will remove and reinstall ceiling in this area.
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. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY

Work Category 23A: HVAC

Sections Included:

- 078413 Penetration Firestopping
- Div 23 Refer to "M" Drawings

Specific Notes/Scope:

1. Provide mechanical permit and inspections by SOM BCC.
2. Demo existing condensate drains. See Sheet AD101.
3. Demo existing mechanical vents. See Sheet AD101.
4. Furnish and install gas piping from existing boiler room across roof to new RTU, including specified roof pipe support block. Coordinate with WC 26A to allow placement of new conduit on these supports.
5. Coordinate with WC 05A for support framing and duct openings in steel for RTU.
6. Coordinate with WC 07A for flashing of RTU roof curb.
7. Furnish and install RTU as detailed on equipment schedule.
8. Furnish and install all condensate piping required by RTU.
9. Furnish and install HVAC controls and associated wiring and tie into existing BAS. Update graphics with new points.
10. Furnish and install new ductwork and duct accessories. Ductwork to be painted by WC 09B.
11. Furnish and install GRD's.
12. Furnish and install new CUH's.
13. Extend hot water supply and return piping to CUH's. Tie into existing piping above ceiling in corridor. WC 06A will remove and reinstall ceilings to allow access to the existing piping.
14. Apply firestopping to any penetrations related to this scope of work in rated assemblies.
15. Caulk any penetrations through walls related to this WC.
16. Perform factory start-up of equipment and submit written and signed start up reports with closeout documents.
17. 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.
18. Perform training of owner's staff on operation of units and preventative maintenance activities.
19. Perform test and balance and submit report with closeout documents.

Exclusions/Work by Others:

1. Removal and replacement of corridor ceilings (by WC 06A)
2. Roof flashing at gas piping penetration (by WC 07A)
3. Flashing of RTU roof curb (by WC 07A)
4. Painting of gas piping (by WC 09B)
5. Line voltage and connections to equipment (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 26A: Electrical

Sections Included:

- 078413 Penetration Firestopping (partial scope)
- 079200 Joint Sealants (partial scope)
- 260010 Supplemental Requirements 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 Conduits for Electrical Systems
- 260533.16 Boxes and Covers for Electrical Systems
- 260544 Sleeves and Sleeve Seals for Electrical Raceways and Cabling
- 260553 Identification for Electrical Systems
- 260923 Lighting Control Devices
- 262416 Panelboards
- 262726.11 General-Use Switches, Dimmer Switches, and Fan-Speed Controller Switches
- 262726.33 General-Grade Duplex Straight-Blade Receptacles
- 262726.37 Receptacles with Arc-Fault and Ground-Fault Protective Devices
- 265119 LED Interior Lighting
- 265213 Emergency and Exit Lighting
- 281000 Technology Overview
- 281100 Communications Room
- 281600 CAT-6 Cabling
- 281700 Clock System
- 283500 Physical Access Control
- 283600 Security Recording
- 283700 Security Cameras
- 284621.11 Addressable Fire-Alarm Systems
- 285450 Audio Equipment
- 285453 Audio Speakers
- 285470 AV Cabling
- 287100 Technology Pass Thru and Firestop
- 287200 Technology Submittals
- 287600 Technology Labeling
- 287700 Technology Testing
- 287750 Technology Training
- 287800 Technology Warranty

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. Perform demo of all electrical, security, surveillance, and access control items as noted on Sheet AD101.
7. Extend power from existing building across roof to new addition. Coordinate with WC 23A to place conduit on gas piping supports.
8. Furnish and install new Branch Panel EBCP13.
9. Furnish and install all conduit and boxes for wiring installed by this WC. Coordinate with WC 09B for painting of exposed conduit.
10. Furnish and install UG electrical for floor boxes, including excavation, backfill, and compaction of existing soils.
11. Furnish and install conduit and empty junction box for future scoreboard.
12. Furnish and install all line voltage wiring, devices, and cover plates.
13. Connect line voltage to plumbing and HVAC equipment.
14. Furnish and install all light fixtures as scheduled.
15. Furnish, install, and program all lighting controls.
16. Provide a complete fire alarm system, including wiring, devices, programming, and certification. Coordinate with CM for demonstration for BCC and BFS inspectors.
17. Provide complete cabling system for technology scope, including wiring, supports, racks, cabinets, devices, terminations, labeling, testing, and training.
18. Provide complete audio and video system including wiring, equipment, testing, and training.
19. Furnish and install complete access control system as specified. Coordinate installation of this system with WC 06 and 08A door and hardware installation.
20. Furnish and install complete video security system as specified, including wiring, supports, cameras, software, hardware, programming, testing, adjustments, and training.
21. Furnish and install complete paging system as specified, including cabling, speakers, amplifiers, software, configuration, labeling, testing, and training.
22. Furnish and install complete clock system as specified, including clocks, wiring, labeling, testing, and training.
23. Apply firestopping to any penetrations related to this scope of work in rated assemblies.
24. Caulk any penetrations related to this WC through non-rated walls.
25. 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. NOT USED

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY

Work Category 31A: Sitework

Sections Included:

- 031000 Concrete Forming and Accessories
- 032000 Concrete Reinforcing
- 033000 Cast-in-Place Concrete
- 079200 Joint Sealants (related to site concrete only)
- See Civil Drawings

Specific Notes/Scope:

1. Provide layout/staking of building foundation and all site improvements by a surveyor licensed in the State of Michigan. Provide as-built survey upon completion of the project and turn over to CM with closeout documents. Coordinate staking will all other trades and provide offsets for construction of foundations. All other trades will be responsible for protection of stakes when working near them. Surveyor to provide return trip upon completion of foundations and mark placement of steel columns. Surveyor will need to coordinate placement with WC 05A and their shop drawings.
2. Furnish, install, and maintain SESC measures. Provide return trip to remove SESC measures once permanent measures have been established and approved by AHJ.
3. Request Miss Dig staking of all UG utilities prior to excavating. Provide additional staking as necessary if markings are lost during course of work.
4. Maintain surrounding parking lot and roadway and keep free of dirt and debris generated by construction activities.
5. Provide barricading and traffic control required incidental to this scope of work. CM will provide temporary fencing around bus loop/drainage structure area and addition site.
6. Remove canopy roof structure, support columns, and foundations.
7. Remove floor slab and foundations from storage room area.
8. Perform all site demo and pavement removals as outlined on civil and architectural drawings unless noted otherwise in this WC description.
9. Remove existing bollards.
10. Remove existing fencing.
11. Remove existing ADA parking signs.
12. Strip topsoil and stockpile on site for future use.
13. All spoils from excavation activities to be hauled off site.
14. Excavate for building foundations.
15. Maintain open excavations and keep free of water.
16. Backfill building foundations. Coordinate with WC 03A for installation of subgrade rigid insulation.
17. Furnish and install sand backfill for building slab. Compact in place (+/- .10')
18. WC 22A to stub storm lines 5' outside of building. This WC to connect to stub outs and extend to structures and/or tie-in points.

19. Grade site per Sheet 300.
20. Furnish and install catch basins except MH #7. Furnish and install all storm piping and connections.
21. Furnish and install rip rap.
22. Scope existing sanitary service at north side of property and provide video footage to CM for engineer's review. See Sheet C300.
23. The pre-manufactured underground detention system located at the NW corner of the property was previously purchased by Lansing School District under a separate contract. Pre-cast MH #7 has also been pre-purchased by the district. This WC to pick up these materials from LSD warehouse (assume within 10 miles of the project site), deliver to site, and install. Sales tax was previously paid and payment of use tax by this WC is not required.
24. Cut in and furnish, install, and compact subbase for all asphalt paving, concrete curb & gutter, and concrete walks. Grade to +/- .10'.
25. Furnish and install all site concrete, including:
    a. Maintenance strip around perimeter of addition.
    b. Receive steel bollard posts furnished by WC 05A. Excavate, set in place with concrete footing, and fill with concrete.
    c. Receive tube steel columns for dumpster enclosure gate support. Excavate and set in place with concrete. Coordinate layout and placement with WC 05A and 06A.
    d. Excavate, furnish/install re-bar and concrete for wood/composite posts for dumpster enclosure. WC 06A to perform layout and furnish/install posts.
    e. Provide Miss Dig staking for all excavations performed by this WC. Provide additional stakings as necessary if markings are lost during course of work.
    f. Construct concrete dumpster pad.
    g. Construct concrete sidewalks at addition and at bus loop area
    h. Patch concrete sidewalk where removed to install drainage structures west of bus loop.
    i. Construct concrete curb & gutter at bus loop.
    j.
26. Perform fine grading of subbase at areas of asphalt paving.
27. Furnish and install all asphalt paving.
28. Furnish and install asphalt curb.
29. Crack fill and seal parking lot.
30. Furnish and install all pavement markings, including parking lot, bus loop cross walk, and playground area.
31. Furnish and install new ADA parking signs.
32. Respread salvaged topsoil and supplement with new topsoil as needed for lawn areas. Evaluate existing topsoil materials prior to spreading and report any concerns with utilizing the salvaged materials to the CM.
33. Fine grade and rake topsoil. Remove any debris/stone materials generated by raking activities from site.
34. Furnish and install seeding of lawn areas.
35. Furnish and install planting soils.
36. Furnish and install all plantings, mulch, and landscape bed edging.
37. This WC will be responsible for maintenance of landscaping and lawn areas as follows:
    a. Water, mow, weed, and fertilize lawn areas until fully established. CM will facilitate warranty review meetings at 3 months, 6 months, and 12 months after seeding is

complete to review condition of these areas and identify any deficiencies and required corrections.

b. Water and maintain plantings until time of substantial completion. Warranty review meetings related to this work will be conducted at same time intervals as seeding reviews.
c. Touch up any areas of seeding disturbed by natural causes until lawn is fully established. Touch up to include supply and installation of any supplemental topsoil, seeding or additional erosion control measures until lawn is fully established.
d. Touch up any areas in lawn or landscaping that experience settling during the one-year warranty period. This WC to provide all materials incidental to these repairs (ie, topsoil, much, seed, etc.).

38. Conduct training of owner's staff on maintenance and schedules for plantings and lawn areas.

Exclusions/Work by Others:

1. Permits (by CM)
2. Temporary Fence (by CM)
3. ECO-SISS Pipe and Fittings (by LSD)
4. Precast MH #7 (by LSD)
5. Building foundations, building flatwork, or frost stoop foundations/slabs (by WC 03A)
6. Steel bollard posts or imbeds (by WC 05A)
7. Excavation for basketball backboard posts (by WC 06A)
8. Minor demo required to separate canopy structure from existing building (by WC 06A)
9. Demo of storage room CMU walls (by WC 06A)
10. Relocation of existing flag pole (by WC 06A)

Allowances:

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

1. CM Contingency: This WC to include a $10,000 allowance for CM contingency.

Alternates:

1. NOT USED

Unit Prices:

1. NOT USED

END OF WORK CATEGORY

SUBCONTRACTOR AGREEMENT

Contract Date:	Job No:
Subcontractor:	Project Name:

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. Subcontractor assumes 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. 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. The project bidding documents (Bid Documents) include:

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

Per attached quote dated 2/25/21

ARTICLE 2 – CONTRACT PRICE
Work must be approved and accepted by Laux and Owner, Contractor shall pay to Subcontractor:

CONTRACT PRICE:

ARTICLE 3 – CONTACT INFORMATION/LINES OF COMMUNICATION
All communication/correspondence from subcontractors must be directed to Laux. Subcontractors are not to contact owner/architect directly for any reason.

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

Laux Project Accountant (Pay Applications, Contracts, Certified Payroll, General Billing Questions):

Laux Project Engineer (Processing submittals, closeouts, document control, etc.)

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

SUBCONTRACTOR AGREEMENT

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 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 will be a change in arrival time.
- Workers must notify Laux Site Superintendent when leaving site for any reason.
- Subcontractor is to arrive at the site on time/as scheduled and prepared with proper number of workers needed to complete work as scheduled. 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. 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 trades people, 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 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 Subcontractor and at no cost to Laux, owner, or architect. This Subcontractor Agreement assumes that all work proposed by Subcontractor meets all criteria set forth in the project Bid Documents.
- RFI's
    - All RFI's to be forwarded to Laux Project Manager via e-mail 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 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 back-up information within three (3) calendar days of issuance of 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 Laux field office for changes to be documented on. 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 project. Hard copies are required for submission. Any printing costs incurred by Laux, if hard copies are not received, will be back charged to 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, 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 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 architect on the 25th of each month.
- Payment from the owner to Laux for Subcontractor's work is a condition precedent to Laux's obligation to pay Subcontractor for its work. Laux shall have no liability to Subcontractor if Laux does not receive payment from the owner for Subcontractor's work.

SUBCONTRACTOR AGREEMENT

- 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 owner.
- The Subcontractor shall be paid only if the necessary documentations have been received pursuant to Article 6 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.
    - Final retainage billings must be submitted on separate payment application.

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

ARTICLE 8– CONSTRUCTION SITE, FACILITIES, ETC.

- Access to Site—
    - Staging and access as determined by Site Superintendent/owner
- Staging Area/Material Storage/Dumpsters—
    - As directed by 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 site, facilities, layout stakes, etc. caused by Subcontractor or its agents, employees, or independent contractors will be the responsibility of 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 Subcontractor will be back charged to Subcontractor.
- Clean-up
    - Laux will provide a dumpster for all debris generated by this project. Subcontractor may utilize this dumpster for its debris. Boxes are to be broken down prior to disposal.
    - Subcontractor must maintain a neat and orderly jobsite 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. 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 work, it has accepted the site and the work of any prior subcontractors, suppliers, or trades people, 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.

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 parities 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 statue, 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 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 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 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 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 Subcontractor to Laux for any chemical-based products (i.e., adhesives, paints, etc.) prior to start of any work using such products. Each worker to provide all necessary personal safety equipment as required by MIOSHA.

SUBCONTRACTOR AGREEMENT

ARTICLE 15 – CLEAN-UP
The Subcontractor shall maintain the Project premise 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 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 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. incurs 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 the Subcontractor, if any. However, in the case of the events listed in Article 16(g), through (i), 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.

SUBCONTRACTOR AGREEMENT

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 deadline date established by Laux, **Laux will deduct $100.00 per day from final invoice.** Should Laux be required to print hard copies of close-out documents, 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.

ARTICLE 24 – COVID-19
Laux Construction takes the health and safety of our employees/subcontractors very seriously. We have put into place the attached COVID-19 Preparedness and Response Plan.

All subcontractors must provide Laux Construction with a copy of their company's individual plan for preventing exposure, monitoring personnel, and responding to potential COVID-19 cases of their own forces. This plan must be received before work can be performed on the job site.

Laux Construction reserves the right to request COVID-19 test results for any employee/subcontractor before the employee/subcontractor can return to the jobsite.

It is understood that in accepting this offer, you (the Subcontractor) agree to the terms and conditions set forth in this Subcontractor Agreement. I have read and agree to the attached COVID-19 PREPAREDNESS AND RESPONSE PLAN.

Project Name:

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

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General Conditions of the Contract for Construction

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

2023 Sinking Fund Program, in accordance with the Owner-approved plans and specifications, all applicable laws, the Owner's fixed budget, and as otherwise approved by the Owner.

THE OWNER:
(Name, legal status and address)

Lansing School District
519 West Kalamazoo Street
Lansing, Michigan 48933
Telephone Number: (517) 755-1000

THE ARCHITECT:
(Name, legal status and address)

Bergmann Associates
560 5th Street NW
Suite 305
Grand Rapids, Michigan 49505
Telephone Number: (616) 827-4270

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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, Supplementary 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 (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for 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 by 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 for 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 of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) 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 by 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 of expression 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, surveys, 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 15.2.

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

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§ 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," but in all events subject to the terms and qualifications of the Contract Documents.

§ 1.1.11 Where materials, systems and equipment items are referred to in the singular, such reference shall not serve to limit the quantity required. 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 for the Work which may include the bidding requirements, sample 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 by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. If the Drawings and Specifications conflict with each other regarding the quality or quantity of Work required, the better quality and/or the greater quantity shall govern, and shall be provided, 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 any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, 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 any trade. Where responsibility for particular Work is required of the Contractor, the Contractor shall not be released from that responsibility by reason of the location of the Specification, Drawing, or other information that establishes the responsibility. Thus, for 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.

.1 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.

.2 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.

.3 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 Without limiting the applicability of Section 1.2.4, if there should be conflict or ambiguity within any single Contract Document (for 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.

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§ 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 thoroughly first class, executed by competent and experienced workmen.

.1 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.

.2 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 but are necessary for the proper execution and completion of the Work, and are consistent with, and reasonably inferable from, 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 any increase in the Contract Sum.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) 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, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal 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, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service, subject to any protocols established pursuant to Section 1.7, solely and exclusively for 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, Sub-subcontractors, and suppliers 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 any tests, surveys, or inspections at the Project Site and the results therefrom, as well as all photographs, drawings, specifications, schedules, data processing output, computer-aided design/drafting (CADD) system disks/tapes, computations, studies, audits, reports, models and other items of like kind, and all intellectual property, prepared or created for or in connection with the Project and required 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 upon completion of the Work. They are for use 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 for or in connection with the Project, or any concepts or ideas developed in connection with the Project, for 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.

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§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, 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 duly served if delivered in person, by registered or certified mail, by courier, or by 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 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to an appropriate representative of the party to whom the notice is addressed by certified or registered mail, or by 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 upon 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 if 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 Shuldiner or his designee shall serve as initial Owner representatives and shall be reasonably available to Contractor. Except as otherwise provided in Section 4.2.1, 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 upon written request by 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 2.2.1, the Contract Time shall be extended appropriately by a mutual agreement in writing by the Owner and Contractor.

§ 2.2.2 Following commencement of the Work and upon written request by 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 (1) 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 payment when due; or (3) 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 why any evidence provided (or not provided) by the Owner is insufficient. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, 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 2.2.2, the Contract Time shall be extended appropriately 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 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where information is protected by 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

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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 by 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, Sub-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 for permits and fees that are the responsibility of the Contractor under the Contract Documents, including, but not limited to, those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for 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 surveys describing physical characteristics, legal limitations and utility locations for 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 but shall exercise proper precautions relating to the safe 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 by 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 for purposes 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 for purposes of making reproductions pursuant to Section 1.5.2.

§ 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 12.2 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 any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. 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, for this purpose, the Architect) to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, including any 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 any 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

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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 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably 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 default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay 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 15. In the event the Owner directs another entity to perform Work 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 for labor, material, and equipment plus 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 pay 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 if 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 by 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 any failure of 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 for 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 by 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 2.3.4, 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 by 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 by or made known to the

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Contractor as a request for 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 lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require, with a copy of same to be forwarded to the Owner.

§ 3.2.4 If the Contractor believes that additional cost or time is involved 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 15. 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, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public 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 by the exercise of reasonable diligence. Unless the Contractor establishes that such error, inconsistency or omission could not have been discovered by the exercise of reasonable diligence, the Contractor will make such corrections without additional compensation so that the Work is fully 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 evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety 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 evaluate the proposed alternative solely for conformance with the design intent for 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 of any 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 for, 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 pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution 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

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in sufficient time to satisfy the existing Project schedule. The Contractor bears the risk of any failure to timely provide such labor and materials for any reason. The Contractor agrees to execute the appropriate UCC 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 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation 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 unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 The Contractor agrees that neither it nor its Subcontractors will discriminate against any 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. Breach of this covenant may 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 product(s) identified in the Specifications and, where applicable, the name of the installing Subcontractor.

§ 3.4.6 The Architect will reply in writing to the Contractor stating whether the Owner or the Architect, after due investigation, has reasonable objection to any such proposal. If adequate data on any proposed 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 for the safety associated with working with or in the vicinity of such utilities. The Contractor shall coordinate any work required by private and/or public utility companies to provide utilities to the Work and/or shall coordinate relocation of utilities as required by the Work. Any reference to the Owner being responsible for the coordination of, the paying for, 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 chrysolite, amosite, crocidolite, tremolite asbestos, anthorphyllite 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 by 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 evidencing asbestos-free product installation prior to issuance of the final Certificate for Payment 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 report prior to construction. Work is not to disturb any in-place hazardous materials. The Contractor must immediately stop all 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.

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§ 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.

Upon 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 72 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 after final payment hereunder, such 72 hour period shall be extended to seven (7) 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 preserve any and 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 Document(s), 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 3.5.1.

§ 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 transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet 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 from same.

§ 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 by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of 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 lawful orders of public authorities applicable to performance of the Work.

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

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§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown 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 observance of the conditions. The Architect will promptly investigate such conditions and, if the Owner and Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, they 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 Contractor disputes the determination or recommendation, the Contractor shall submit a Claim as provided in Article 15. The requirements of Section 2 of 1998 PA 57, as amended, are hereby incorporated into this document. The Contractor shall be alert to any indication or evidence of existing underground or concealed utilities or structures not shown on the Contract Documents and shall immediately notify the Owner of discovery of 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 activity or from continuing operations without notifying the Owner.

§ 3.7.4.1 The Contractor bidding on the Work is responsible for visiting the site and determining all local conditions that may in any way affect its Work.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any 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 by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features shall be made, as needed, as provided in Article 15.

§ 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 for such amounts and by 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 required 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 for 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 accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 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

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remove any 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 (1) has reasonable objection to the proposed superintendent or (2) 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, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits required under the Contract Documents or any scheduling updates issued by the Architect or Owner. The schedule shall be revised at appropriate intervals as required by the conditions of the Work 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 for damages or additional compensation by the Contractor for delay or otherwise. The Contractor shall be required to conform to the most recent Owner-approved schedule and acknowledges that fact was taken into account when it agreed to the Contract Sum and entered into this Contract.

§ 3.10.2 The Contractor, promptly after being awarded 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 (1) be coordinated with the Contractor's construction schedule, (2) allow for a reasonable amount of time to review submittals, and (3) shall provide for expeditious and practical execution of the Work. 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 any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent approved Project schedules and the most recent Work 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 Work. 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 Work for conformance with the requirements of the Construction Schedule and shall promptly advise the Owner of any delays or potential delays. If any progress report indicates any delays, the Architect shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment of the Contract Time or any Milestone Date or the Contract Sum unless any such adjustment is agreed to by the Owner and authorized pursuant to a Change Order.

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§ 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 required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work 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 Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor for submittal to and review by the Architect to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor for submittal to and review by the Architect to illustrate materials or equipment for some portion of the Work. All Work 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 Work.

§ 3.12.3 Samples are physical examples for submittal to and review by the Architect that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals 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 for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

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

Because the schedule does not allow for the resubmission of any Shop Drawing, Project Data, Sample or similar submittals, the Contractor agrees to ensure that its first submissions shall comply with all the requirements of the Contract Documents. It is further agreed that if, for whatever reason, any Shop Drawing, Project Data, Sample, or similar submittals require more than one resubmission to secure the approval of the Architect, the Contract amount may be reduced by (1) the amount of the actual delay damages charged or suffered by the Owner, but in any event not less than $100 per day, plus (ii) the actual cost of the Architect's review(s) for each subsequent resubmission necessary to secure the aforementioned approval(s). Without limiting the foregoing, the Contractor's obligation to hold the Owner harmless from and bear the costs for any delay, good faith rejection of or resulting from any Shop Drawing, Project Data, Sample or similar submittal by Architect is conditioned on such delay or rejection being attributable to an act or omission of Contractor.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

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

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§ 3.12.8 The Work shall be in accordance with approved submittals except 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 (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) 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, by 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 for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for 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 by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. Subject to its professional skill and expertise, the Contractor shall be entitled to rely upon 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 an appropriately 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, if 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 upon 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, 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 (5) days prior to the commencement of the requested disruption, and shall detail (1) the exact nature and duration of such interruption, (ii) the area affected, and (iii) any impact upon 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 any Work for which appropriate notice was not furnished.

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§ 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 fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by 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 keep the premises and surrounding area 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 up 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 concurrently occupied space both occupied by the Owner and used in the progress of the Work, both within the limits of the construction site and the 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 any broken glass, 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 wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for 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 manufacturers 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, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect. The review by the Owner or Architect of any method of construction, invention, appliance, process, article, device or materials of any kind shall be for its adequacy in the Work and shall not be an approval for the use 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

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negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In addition to and not in limitation of the Contractor's other indemnity obligations, the Contractor hereby accepts and assumes exclusive 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 thereof) which may be payable under the unemployment insurance law of any state, the federal Social Security Act, federal, state, county, and/or municipal tax withholding laws, or any other law, measured upon the payroll of or required to be withheld from employees by 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 thereof) 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 for, through or under it or any of them, by reason of the performance of the Work or the acquisition, ownership, furnishing, or use of any materials, equipment, supplies, labor, services, or other items for 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 by whomsoever employed, engaged in the Work to be performed and furnished under this Contract.

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 attorney 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, disturbed, or dispersed of by Contractor.

§ 3.18.3 In the event that any claim is made or asserted, or lawsuit filed for 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 pleadings thereto, as well as a full and accurate report of the facts involved.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 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 be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment 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,

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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 On the basis of the site visits, the Architect will keep 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 (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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 any 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 by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and 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 for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, 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 for 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 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any 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 for approval Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 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; issue Certificates of Substantial Completion pursuant to

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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 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 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 reasonably inferable from, 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 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. If appropriate, 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 if 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 Sub-subcontractors at any tier 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 enjoy all third-party beneficiary rights permitted by law.

§ 5.1.2 A Sub-subcontractor 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 if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-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 (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. All contractual agreements with additional persons or entities serving as a Subcontractor or supplier shall expressly identify the Owner as a third-party beneficiary, and the Owner shall enjoy 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 but rejected Subcontractor was reasonably capable of performing the Work, despite the Architect's or Owner's

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reasonable objection, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute 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 responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if 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 (10) days prior to such proposed change.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by 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 Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit 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 Sub-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 Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond 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 may be adjusted 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.

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§ 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 Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any 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 subsequently revised.

§ 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 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. Failure of the Contractor to notify the Architect of 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 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 payable 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 partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 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 a duty, and should the Owner choose not to pursue 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 for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon 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 for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under 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 for a minor change in the Work.

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§ 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 upon 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 any 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 by 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 used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one or more of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

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. If the Contractor does not respond promptly or disagrees with the method for 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 7.3.3.3, the Contractor shall keep 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 for the purposes of this Section 7.3.6 shall be limited to a reasonable amount of the following that are actually incurred by the Contractor:

.1 Costs of labor, including applicable payroll taxes, 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, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, 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 15.

§ 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,

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provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time. Contractor agreements to a Construction Change Directive shall require a follow-up writing or signature as contemplated in Section 7.3.7.

§ 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 for 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 by 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 Work or substitutions are involved 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 payment for undisputed Work completed under the Construction Change Directive in Applications for Payment. For those undisputed portions, the Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount 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 15.

§ 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 upon 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, any payment or any extension of time for additional or changed work, whether partially 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 Constructive 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 believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall either (i) file a Claim in accordance with Article 15 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 payment, 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 any 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 9.8.

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

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§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by 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 preparation for Owner move-in 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 (14) 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 (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by fire, government-declared emergencies, unavoidable casualties, significant and unusual adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending litigation, mediation, arbitration or binding dispute resolution, as applicable; or (5) by other causes that the Contractor asserts, and the Architect determines, justify 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 subparagraph, 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 8.3 precludes recovery of damages for 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 for 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 for any reason by 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, supervision 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 for such delay damages shall be to pursue such claims directly against the individual or entity which caused the delay.

For any delay claims raised against the Owner for any reason, the Contractor's sole and exclusive remedy is an extension of time to perform the Work not to exceed the time frame of any proven 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 by a court of competent jurisdiction that the Owner is liable for such delay despite the other terms of this Contract barring any Owner liability for damages for delay, then the Owner shall be liable to the Contractor for liquidated damages in the amount of not to exceed One Hundred Dollars ($100) 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, out of sequence work, overhead, crowding, tools, equipment, rentals, etc.

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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 by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably 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 supported by 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 supported by such 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 for each major item of work and each subcontracted item of work is shown with materials and labor indicated separately on AIA Document G702 - Application and Certificate of Payment, and AIA Document G703 - Continuation Sheet, or otherwise.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen (15) 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 for completed portions of the Work. The application shall be notarized, if required, and supported by 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 if provided for in the Contract Documents. The form of Application and Certificate for Payment shall be AIA Document G702, Application and Certification for Payment, supported by AIA Document G703, Continuation Sheet, unless otherwise agreed by the Owner. Applications for Payment are due to the office of the Architect by the designated day 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 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by 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 qualified in writing at the time of request, constitute full and complete consent to the Construction Change Directive(s) and to the issuance of a Change Order.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for 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 (1) an Affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the previous application was submitted and for which the Owner might in any way be responsible have been paid or otherwise satisfied, and (2) a release or waiver of liens arising out of the Contract from each Contractor and/or Subcontractor, materialman, supplier and laborer for the Contractor addressing all previous Applications for Payment submitted for the Project.

§ 9.3.1.4 The Contractor must provide copies of the insurance certificates, bonds, and the same for 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 suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location

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agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon 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 off-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 fabricated 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 for delivery to the Project and that they will not be used for another purpose.

.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 Work.

.4 Evidence of adequate insurance covering the material in storage, which shall name the Owner as additionally insured.

.5 Costs incurred by the Architect to inspect material in off-site storage shall be paid by the Contractor.

.6 Subsequent pay requests shall itemize the materials and their cost which were approved on previous pay requests and remain in off-site storage.

.7 When a partial payment is allowed on account of material delivered on the site of the Work or in the vicinity thereof or under possession and control of the Contractor, but not yet incorporated therein, such material shall become the property of the Owner, but if such material is stolen, destroyed or damaged by casualty before being used, the Contractor will be required to replace it at its own expense.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued 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, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 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 for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for 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 9.5.1; or (3) withhold certification of the entire Application for 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 for 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 Work 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 payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect, in writing, together with the certification to which it pertains. However, unless otherwise required by the Owner/Architect Agreement, any other Contract Document, or applicable law, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions 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 previously paid 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.

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§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for 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 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied, or the Contractor is in uncured default on the Agreement;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- **.7** failure to carry out the Work in accordance with the Contract Documents;
- **.8** the Work not having progressed to the extent set forth in the Application for Payment;
- **.9** representations of the Contractor are untrue;
- **.10** failing to conform to Project Schedule;
- **.11** default in the performance of any obligation to the Owner under another contract; or
- **.12** failure to provide sufficiently 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 15.

§ 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 for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.5.5 If the Contractor disputes any determination by the Owner or Architect with regard to any Certificate for Payment, the Contractor shall nevertheless continue to expeditiously 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 pay the Contractor absent 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 for Payment creates an obligation on the Owner to pay 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 for Payment, the Owner shall make 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 pay each Subcontractor, no later than seven days after receipt of 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 Sub-subcontractors in a similar manner.

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§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by 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 properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. 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 properly paid. Neither the Owner nor Architect shall have an obligation to pay, 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, after providing Contractor with ten (10) 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 for 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 for 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 proposed 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 overpay, within ten (10) 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 for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which 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 any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements 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 of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.6.9 Subject to applicable law, if a petition in bankruptcy or any other arrangement or proceeding regarding insolvency, assignment for 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 for progress payment has been properly filed, until expiration of the period of any guarantees or warranties required for the Contractor, and the Owner may pay out 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

If without justifiable basis 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 undisputed amount asserted by the Contractor in its Application for Payment or awarded by a court, then the Contractor may, upon twenty-one (21) additional days' written notice to the Owner and Architect, stop the Work until payment of the undisputed amount owing has been received. The Contract Time shall be extended appropriately 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

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good faith any amount requested by the Contractor, and, irrespective of the Architect's issuance of a Certificate for Payment, the Owner's right to withhold payments from the Contractor, including, without limitation, to correct Work 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 for 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 for 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 by 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 fix 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 for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work 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 (15) 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 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 re-inspection of the Work. Failure to pay such costs within ten (10) 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 by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public 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 reasonably directed and shall cooperate with the Owner to limit interruptions.

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§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.9.4 Any agreement as to the acceptance of non-conforming Work 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 representative 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 fully performed, 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 found to be 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 (1) an affidavit that payrolls, bills for 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 by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) 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, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, (6) an affidavit that states the Work is fully completed and performed in accordance with the Contract Documents, (7) in the event of Contractor bankruptcy, at the Owner's option, an order entered by the court having jurisdiction of the Contractor's insolvency proceeding authorizing such payment, (8) a general release executed by the Contractor on a form provided by the Architect, (9) all close-out documents, (10) all warranties collected and provided in an acceptable manner, and (11) if required by the Owner, other data establishing 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 money 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 by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work 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 payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such 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 Claimsalready 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;

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.3 terms of all warranties required by the Contract Documents or provided at law or in equity; or
.4 audits performed by the Owner, if permitted by the Contract Documents, after final 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 pending 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 Work and adjacent property as required by law, the Contract Documents, or as otherwise required, to cause no damage to the Work and adjacent property during the execution of the Work. This requirement shall also apply to structures above and below ground as conditions of the site require. The Contractor shall also provide recommendations and information to the Owner regarding (a) the assignment of responsibilities for safety precautions and programs by the Subcontractors and responsibilities for safety precautions and programs by the Subcontractors and the Owner for the safety of the Owner, and the general public; (b) temporary facilities; and (c) equipment, materials and services for 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 for the safe 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 by 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 thereby;
.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 Sub-subcontractor; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, 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 public 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 any injury to any of Contractor's or its Subcontractor's employees at the site within one (1) 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

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signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. 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 anyone directly or indirectly employed by either of them, or by anyone for 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 3.18.

§ 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 for 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 21 days after discovery. The notice shall provide sufficient detail to enable the Owner to investigate the matter. This provision shall be for investigative 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. Injury or damage to persons or property suffered by the Owner because of an act or omission of the Contractor, or others for 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 Work of another shall be responsible for the repair and replacement of such damaged Work. Back charges shall be made against the Contract Sum of the damaging Contractor when corrections are not made promptly.

§ 10.2.8.2 If the Contractor or any Subcontractor chooses to use any systems, equipment, facilities, or services which have been incorporated in the Project as a permanent part thereof by any other, 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 used 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 if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing

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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 laboratory to verify the presence or absence of the material or substance reported by 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 qualifications 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 upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately to address shutdown, delay, and start-up.

§ 10.3.3 NOT USED.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 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 (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, 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 15 and Article 7. Nothing in this paragraph will be construed as relieving Contractor from the cost and responsibilities for emergencies covered hereby.

§ 10.5 Notification of Utility Companies

§ 10.5.1 At least five (5) working days prior to the start of work in areas which may involve existing utility lines, the Contractor shall notify the MISS DIG notification system, as legally required and, if applicable, any Registered Utility Protection Service of the utility company possibly affected by the planned work by certified mail with return receipt requested.

§ 10.5.2 The utility company should, upon receipt of notice, stake, mark or otherwise designate the location (and depth) of their lines, or temporarily move the line(s). The Contractor shall wait for the applicable utility to stake 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 break 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 line(s) 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 workplace for all

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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 firefighting equipment and shall at no time block off main roadways or fire aisles without providing adequate auxiliary roadways and means of entrance for firefighting equipment, including heavy fire department trucks, where applicable.

§ 10.7.2 The Contractor shall at all times cooperate with the Owner and kept the municipal fire department informed of the means of entrance and changes to the roadways or fire aisles as needed to provide fire department access to or 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 of 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 any and all costs incurred in any way related to clean up related to any 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 product(s) 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 by 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 payment of obligations arising thereunder, each in the penal sum of 100% 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 any contract valued at $50,000 or less shall also include payment and performance bonds each in the penal sum of up to 100% 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
b.	Employer's Liability	-	$1,000,000 Each Accident
		-	$1,000,000 Each Employee
		-	$1,000,000 Policy Limit

.2 Comprehensive General Liability

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	a. Bodily Injury	-	$1,000,000 Each Occurrence
		-	$2,000,000 Aggregate
	b. Personal Injury	-	$1,000,000 Each Occurrence
		-	$2,000,000 Aggregate
.3	Automobile Liability		
	a. Bodily Injury	-	$1,000,000 Each Person
		-	$1,000,000 Each Occurrence
	b. Property Damage	-	$1,000,000 Each Occurrence
.4	Independent Contractors	-	$1,000,000 Each Occurrence
.5	Products and Complete Operations	-	$1,000,000 for one (1) year, commencing with issuance of final Certificate for Payment
.6	Contractual Liability	-	$1,000,000 Each Occurrence
.7	Asbestos Abatement Liability	-	$1,000,000 Per Claim
		-	$2,000,000 Aggregate
.8	Pollution	-	$1,000,000
.9	Umbrella Coverage	-	$4,000,000

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of 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 for 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 afforded to the Additional Insured is primary insurance. If the Additional Insureds have 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 any insurance required by the Contract Documents, but in no event less than the sooner of three (3) days after becoming aware or the coverage actually 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 any and 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 Owner, have the right, but not the obligation, to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required 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 exclude any tools, equipment, scaffolding, glass breakage, 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 product until the Date of Final Completion is established by the Architect/Engineer. The Contractor shall replace any Work if 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

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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 Sub-Subcontractors in the Work and the parties shall negotiate an adjustment to the Contract Sum and Contract Time. Property Insurance provided by the Owner will cover only Work incorporated into the construction and will not cover tools, equipment, or other property owned, leased, rented, or borrowed by the Contractor, Subcontractor, Sub-Subcontractor, or others.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by 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: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor and (2) 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 by an appropriate 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 insurer(s) may have to subrogation. To the extent any term in the Contract Documents contrary to this provision, such term is void and unenforceable.

§ 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 property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments 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 for 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 be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. 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 15 if the Contractor timely and properly files a claim under Article 15.. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for 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, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time or Contract Sum.

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§ 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 uncovered by 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 use of any contingency.

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, 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 for any such costs and expenses and to deduct such amounts from any future payments due the Contractor.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any 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 given 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 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by 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 for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 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 Owner 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 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 3.5. Establishment of the one-year period for correction of Work as described in Section 12.2.2 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 Work deficiencies and/or punch list items. Failure to correct Work deficiencies and/or punch list items in a timely fashion shall be a substantial breach, and the Owner

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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 14.2. Whether or not the Contract is terminated, if the Contractor fails to make corrections in a timely fashion, such Work 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 future payments due the Contractor accordingly. The Contractor shall promptly notify the Architect in writing when Work deficiencies and/or punch list items are completed. If upon review of the Work by the Architect, after such notification by the Contractor, Work 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 for reinspections of the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers 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 for breach of the Contract Documents brought by the Owner shall not be deemed untimely if filed within six (6) 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 of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be 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 by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful 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 for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are 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

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authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by 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 for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by 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 approval shall, unless otherwise required by 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 approvals required by 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 payment is due at the rate the parties agree upon 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 any late payments by the Owner, the interest rate shall not exceed five percent (5%) per annum (see MCL 438.31).

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 for a period of 30 consecutive days for reasons within the Owner's control and through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2

.3 Because the Owner has not made payment on an undisputed Certificate for Payment within the time stated in the Contract Documents, subject to justifiable withholding of payment as described herein or in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day 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 payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days for reasons within the Owner's control and through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, 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 14.1.3.

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§ 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 properly skilled workers or proper materials to the point of negatively impacting the Project and/or the related schedule;

.2 fails to make 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 of a provision of the Contract Documents; or

.5 the Contractor fails to prosecute the Work or any part thereof with promptness and diligence, or goes into bankruptcy, liquidation, makes an assignment for 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 prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, three (3) 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 Exclude 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 5.4; and

.3 Finish the Work by 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 by the Owner, such notice shall be adequate to satisfy the three (3) day written notice described above in this Section.

The three (3) 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 for 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 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for 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 expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, 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 application, and this obligation for payment 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 for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases 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 extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by 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.

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§ 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 except for Work directed 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 properly executed and costs incurred by reason of the termination.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment 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 for performance, or damages for 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 15.1.1 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 subparagraph 15.1.1 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, excepting Warranty claims which shall be controlled by the warranty 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 pursue 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 period specified by applicable law, but in any case not more than 10 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 15.1.2. The Owner shall commence all claims and causes of action in accordance with Section 13.1 and Section 15.1.2.1, 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 15.1.2 and Section 15.1.3, 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 13.1.

§ 15.1.2.2 Surety Notice and Prior Approval

Except where otherwise expressly required by the terms of the Agreement or the General Conditions, 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 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 theContractor, 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 12.2.2, 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

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Initial Decision Maker. Claims by the Contractor shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 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 by 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 required prompt filing of 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 9.7 and Article 14, 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 for an increase in the Contract Sum, written notice as provided in Section 15.1.3 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 for 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 10.4. A Project delay shall not be a basis for a Claim or cause of action for additional cost by the Contractor. Delays may be remedied only through an extension of time per Sections 8.3.4 and 15.1.6.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of probable effect of delay on progress of the Work due to the increase in Contract Time sought. 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 for additional time, such Claim shall be documented by 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 for consequential damages arising out of or relating to this Contract. This waiver includes, without limitation damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for 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 for initial interpretation. The Architect will serve as the Initial Decision Maker. Except for those Claims excluded by this Section 15.2.1, an initial interpretation 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 interpretation 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 interpretation

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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: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) 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 (10) days of a written request, the Contractor shall make available to the Owner or its representative 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 (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, 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 (1) be in writing; (2) state the reasons therefor; and (3) 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, if any, of the nature and amount of the Claim. If the Claim relates to a possibility 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 by the parties, Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4 and 9.10.5, 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 by mediation which, unless the parties mutually agree otherwise, shall be administered by 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 may be made concurrently with the commencement of the parties-agreed-upon dispute resolution proceedings but, in such event, mediation shall proceed in advance of such proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. All limitations periods shall be tolled during the mediation process.

§ 15.3.3 NOT USED.

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§ 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 thereof.

§ 15.4.4 Consolidation or Joinder

The Contractor further agrees to include similar dispute resolution provisions in all agreements with the Subcontractors, 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 Subcontractors, 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 statutes of limitation would bar legal or equitable proceedings. During the pendency of any 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 any 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 any event the Owner believes 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 Owner, in its discretion, determines the Contractor should become a party to that dispute by joinder or otherwise. Any mediation or arbitration hearing shall be held in the general location where the Project is located, unless another location is mutually agreed upon.

Modified: 7/25/22; 5:31 pm

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Lansing School District

Attwood Elementary Cafeteria Addition
SO-1790

915 Attwood Dr.
Lansing, Michigan 48911

Project Manual

Bids & Permits

Date: 9/18/2023

Project No: 23005898A

Prepared By:
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560 5th St. NW
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Grand Rapids, MI 49504

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

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

1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

a. Furniture.

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 suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner 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.

1.6 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
2. Cover and protect furniture, furnishings, and equipment that have not been removed.

B. Remove temporary barricades and protections where hazards no longer exist.

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. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 4-hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area off-site.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. 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 small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

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.

B. Burning: Do not burn demolished materials.

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

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Shoring, bracing, and anchoring.

B. Related Requirements:

1. Section 033000 "Cast-In-Place Concrete" for expansion strips and vapor retarders.
2. Section 055000 "Metal Fabrications" for metal items embedded in cast-in-place concrete.

1.2 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Each type of insert for concrete
2. Form ties.
3. Form-release agent.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspection agency.

1.5 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

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.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:

a. Plywood, metal, or other approved panel materials.

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. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

B. 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.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

C. 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.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

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.
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.

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 where indicated on Drawings.

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 and as follows:.

    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 dovetail anchor slots in concrete structures, as indicated on Drawings.
4. Clean embedded items immediately prior to concrete placement.

3.3 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

END OF SECTION

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.

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.

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.

1.4 INFORMATIONAL SUBMITTALS

A. 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.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 Grade, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. 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.

C. Steel 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.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire 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. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel-reinforcement placement.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 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 and form liners.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 033543 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
4. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.

c. Vapor-retarder installation.
d. Anchor rod and anchorage device installation tolerances.
e. Cold and hot weather concreting procedures.
f. Concrete finishes and finishing.
g. Curing procedures.
h. Forms and form-removal limitations.
i. Shoring and reshoring procedures.
j. Methods for achieving specified floor and slab flatness and levelness.
k. Floor and slab flatness and levelness measurements.
l. Concrete repair procedures.
m. Concrete protection.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. 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.

5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Joint fillers.
9. Repair materials.

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. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
9. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Ready-mixed concrete manufacturer.
2. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Vapor retarders.
7. Semirigid joint filler.
8. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

    a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician .

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. 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."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.

4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size:

a. Footings: 1-1/2 inches.
b. Foundation walls and slabs: 3/4 inch.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture:

1. Comply with ASTM C260/C260M.

2. Products: Subject to compliance with the requirements, provide one of the following:

    a. W.R. Grace & Company, Daravair 1000.
    b. Master Builders, MasterAir AE 200.
    c. Pre-approved equal.

E. 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.

1. Water-Reducing Admixture:

    a. Comply with ASTM C494/C494M, Type A.
    b. Products: Subject to compliance with the requirements, provide one of the following:

        1) W.R. Grace & Company, Mira 110.
        2) Master Builders, MasterPolyheed 1020.
        3) Pre-approved equal.

2. Water-Reducing and -Retarding Admixture:

    a. Comply with ASTM C494/C494M, Type D.
    b. Products: Subject to compliance with the requirements, provide one of the following:
        1) W.R. Grace & Company, Daratard 17.
        2) Master Builders, MasterSet R100.
        3) Pre-approved equal.

3. Water Reducing and Accelerating:

    a. Comply with ASTM C494, Type E, or combine ASTM C494, Type A and Type C admixtures.
    b. Products: Subject to compliance with the requirements, provide one of the following:

        1) W.R. Grace & Company, Mira 110.
        2) Master Builders, MasterSet FP20
        3) Pre-approved equal.

4. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Barrier-Bac; Inteplast Group, Ltd.
    b. Fortifiber Building Systems Group.
    c. ISI Building Products.
    d. Poly-America, L.P.
    e. Raven Industries, Inc.
    f. Reef Industries, Inc.
    g. Stego Industries, LLC.
    h. Tex-Trude, LP.
    i. W.R. Meadows, Inc.

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. BASF Corporation.
    b. ChemMasters, Inc.
    c. Concrete Sealers USA.
    d. Dayton Superior.
    e. Euclid Chemical Company (The); an RPM company.
    f. Kaufman Products, Inc.
    g. Laticrete International, Inc.
    h. Vexcon Chemicals Inc.
    i. V-Seal Concrete Sealers & Specialty Coatings.
    j. W.R. Meadows, Inc.

2.5 CURING MATERIALS

A. Water: Potable or complying with ASTM C1602/C1602M.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.8 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 follows:

1. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing 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, and concrete with a w/cm below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.9 CONCRETE MIXTURES

A. Provide concrete mixtures for various applications as scheduled on the Drawings.

2.10 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 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.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder 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 retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 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.
4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
5. Locate horizontal joints in walls at underside of floors, slabs, and at the top of footings or floor slabs.
6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.

7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. 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.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder 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.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. 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..

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

    a. Perform no later than one day after form removal.
    b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

2. Grout-Cleaned Rubbed Finish:

    a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    b. Do not clean concrete surfaces as Work progresses.
    c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    d. Wet concrete surfaces.
    e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.

C. 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.

3.8 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 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.

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 restraighten 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] <Insert locations>.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

    a. Slabs on Ground:

        1) Specified overall values of flatness, FF 35; and of levelness, FL 25; with minimum local values of flatness, FF 24; and of levelness, FL 17.

    b. Suspended Slabs:

        1) Specified overall values of flatness, FF 35; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15.

E. 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.

3.9 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.

3.10 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.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. 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.

C. 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.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than seven days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.

4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

    a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

    a. Correct low and high areas.
    b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

    a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

    a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
    b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

    a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
    b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 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 be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. 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.

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. Compression Test Specimens: ASTM C31/C31M:

   a. Cast and laboratory cure two sets of three 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C39/C39M.

   a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
   b. 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 72 hours of completion of floor finishing and promptly report test results to Architect.

3.16 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

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polished concrete finishing.
2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete and associated finishes not designated as polished concrete.

1.2 DEFINITIONS

A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Cast-in-place concrete subcontractor.
e. Polished concrete finishing Subcontractor.

2. Review cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of exposed color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Repair materials.
2. Liquid floor treatments.

1.6 PERFORMANCE REQUIREMENTS

A. Provide polished flooring system that has been selected, manufactured and installed to achieve the following:

1. Abrasion Resistance: ASTM C779, Method A, high resistance, no more than 0.008 inch wear in 30 minutes.
2. Waterproof Properties: Rilem Test Method 11.4, 70% or greater reduction in absorption.
3. Reflectivity: Increase of 55% when taken with a standard gloss meter.
4. High Traction Rating: NFSI 101-A, non-slip properties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has speciallized in installation of work similar to that required for this project for a minmum of 3 years and 5 like projects. The experienced installer must be actively involved on-site when work in this section is being performed. The installer must be acceptable to or licensed by manufacturer of products being installed.

B. Source Limitations: Obtain products specified in this seciton from a single manufacturer. Provide accessories from manufacturer specified to ensure color and performance harmonization.

C. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size as directed by Architect.
2. Demonstrate curing, finishing, and protecting of polished concrete.
3. 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 & HANDLING

A. Deliver materials in manufacturer's original packaging with identification lables and seals intact.

B. Store materials prtected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.9 FIELD CONDITIONS

A. Environmental Requirements:

1. Limit dust caused by polishing. HEPA filters are required for Dry Polishing. Dust & Slurry resulting from polishing must be managed and disposed of in accordance with OSHA & Environmental standards.
2. Remove standing water from floor imediately after polishing.
3. Comply with all applicable environmental requirements. Do not use products that are toxic or otherwise detrimental to the environment.

B. Potect concrete slab from construction actions detrimental to final finish throughout duration of construction, including the following:

1. Petroleum stains
2. Restrict vehicular parking and associated tire marks.
3. Restrict use of pipe cuttingh machinery.
4. Restrict placement of reinforcing steel on slab to avoid rust staining.
5. Restrict use of acids or acidic detergents on slab.

C. Ambient Conditions: Comply with manufacturer's written instructions regarding temperature and slab moisture.

D. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Subject to compliance with the requirements, provide products by AmeriPoilish by American Decorative Concrete or one of the following:

1. Pre-approved equivalent.

2.2 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

PART 3 - EXECUTION

3.1 SITE VERIFICATION

A. Verify that concrete substrates have met specified floor flatness requirements specified in other sections.

B. Verify Concrete Slab Performance Requirements: Verify concrete is cured to 28 day strength specified in other sections.

C. Verify that concrete substrates, which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete finishing materials.

1. Application of products indicates acceptance of previous work.

3.2 PREPARATION

A. Ensure surfaces are clean and free of dirt and foreign matter harmful to performance of concrete finishing materials.

3.3 POLISHING

A. Finish and Appearance Quality Standards per Concret Polishing Association of America (CPAA):

1. Level of cut/aggregate exposure based on the following criteria:.

a. Class B, Salt/Pepper: Exposing the fine aggregate such as sand and small aggregate within the substrate. Although the actual depth of grind will depend on the placement and finishing procedures, it is anticipated that this level of cut can be achieved within 1/16-inch of the surface.

2. Level of sheen in accordance with ASTM E430 when the concrete surface is mechanically processed:

a. Polish: Level 3: High sheen, 800 grit.
b. Gloss readings are not to be obtained through the use of any microfilming products, sealers, coating, enhancers, or the result of resin transfer from resin bond abrasives.

c. Readings shall be taken not less than 10 feet on center in field areas and within 1 foot of floor area perimeters.

B. Apply polished concrete finish system to cured and prepared slabs to match accepted sample.

1. Machine grind floor surfaces to receive polished finishes level and smooth .
2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
4. Control and dispose of waste products produced by grinding and polishing operations.
5. Neutralize and clean polished floor surfaces.

3.4 ADJUSTMENTS

A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.

B. Fill joints flush to surface.

3.5 FINAL CLEANING

A. Mechanically scrub treated floors for seven days with soft to medium pads with approved cleaning solution per manufacturer's written requirements.

B. Remove spatter from adjoining surfaces as necessary.

C. Remove debris from jobsite.

3.6 PROTECTION

A. Protect finished work until fully cured in accordance with manufacturer's recommendations.

B. Protect final installation following completion through duration of construction.

END OF SECTION

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry-joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

1. Steel lintels in unit masonry.

C. Related Requirements:

1. Section 072100 "Thermal Insulation" for cavity wall insulation.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.

a. For masonry units, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.
3. Joint reinforcement.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners that are to remain exposed upon completion of work unless otherwise indicated.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed decorative units at the base of the exterior facade.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) ACM Chemistries.
2) BASF Corp. - Construction Chemicals.
3) Euclid Chemical Company (The); an RPM company.
4) GCP Applied Technologies Inc.

5) Moxie International.

C. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
2. Density Classification: Normal weight unless otherwise indicated.
3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

D. Decorative CMUs: ASTM C90.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grand Blanc Cement Products, Burnished Masonry Units, Color Greystone White or comparableproducts by one of the following:

   a. Pre-approved equivalent.

2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
3. Density Classification: Normal weight.
4. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
5. Pattern and Texture:

   a. Standard pattern, ground-face finishas indicated by manufacturer's designations.

6. Colors: As indicated by manufacturer's designations.

2.5 CONCRETE MASONRY LINTELS

A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 MORTAR AND GROUT MATERIALS

A. Hydrated Lime: ASTM C207, Type S.

B. Masonry Cement: ASTM C91/C91M.

C. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

D. Aggregate for Grout: ASTM C404.

E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with decorative CMUs at the exterior base of the building containing integral water repellent from same manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ACM Chemistries.
b. BASF Corp. - Construction Chemicals.
c. Euclid Chemical Company (The); an RPM company.
d. GCP Applied Technologies Inc.

G. Water: Potable.

2.7 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dur-O-Wal; a Hohmann & Barnard company.
b. Heckmann Building Products, Inc.
c. Hohmann & Barnard, Inc.
d. Wire-Bond.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Mill- Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon Stainless steel.
3. Wire Size for Side Rods: 0.148-inch 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch 0.187-inch diameter.
5. Wire Size for Veneer Ties: 0.148-inch 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.8 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
2. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.

C. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.030-inch-thick steel sheet, galvanized after fabrication 0.060-inch-thick steel sheet, galvanized after fabrication 0.031-inch-thick, stainless steel sheet 0.062-inch-thick, stainless steel sheet.

D. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate wire ties from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
3. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) FERO Corporation.
2) Hohmann & Barnard, Inc.
3) Heckmann Building Products, Inc.

2.9 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.

2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
4. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
5. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Solder metal items at corners.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch 0.040 inch.

a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
4. Where flashing is fully concealed, use flexible flashing.

D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Advanced Building Products Inc.
2) Heckmann Building Products, Inc.
3) Hohmann & Barnard, Inc.
4) Wire-Bond.

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
b. EaCo Chem, Inc.
c. PROSOCO, Inc.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use masonry cement mortar.
4. For reinforced masonry, use masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M or S.
2. For reinforced masonry, use Type M or S.
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond ; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow brick CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

D. Cut joints flush where indicated to receive air barriers unless otherwise indicated.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together as follows:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Install steel lintels where indicated.

B. Provide concrete masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and 1-1/2 inches into the inner wythe. Form 1/4-inch hook in edge of flashing embedded in inner wythe.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/cavity vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

3.11 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

I. Prism Test: For each type of construction provided, according to ASTM C1314 at 28 days.

3.13 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.14 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shrinkage-resistant grout.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting requirements.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

B. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.
3. Column base plates thicker than 2 inches.

C. Fabricator: An individual, firm or corporation that assembles raw structural steel items into structural steel building members.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Shop primer.
6. Galvanized-steel primer.
7. Galvanized repair paint.
8. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand-critical welds.
8. Identify members not to be shop primed.

C. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.

3. Tension-control, high-strength, bolt-nut-washer assemblies.

F. Survey of existing conditions.

G. Field quality-control reports.

H. The work under this Section shall be performed by a Fabricator and Erector acceptable to the Owner. The Fabricator and Erector shall submit conclusive evidence of having satisfactorily completed work of similar scope and of having the necessary skill, equipment, facilities and capacity to fabricate the structural steel and to perform the erection in accordance with the construction schedules and in full compliance with requirements of the Contract Documents.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide positive identification for each steel type and tensile strength classification except A36 steel, by a uniform marking system on each piece. All steel shall be newly rolled steel.

2.2 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 341.

3. ANSI/AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Option 3 and 3B: Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.

a. Use Allowable Stress Design; data are given at Service-level loads.

C. Construction: Braced frame with shear wall system.

2.3 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: Material and Grade per drawings.

B. Channels, Angles: Material and Grade per drawings.

C. Plate and Bar: Material and Grade per drawings.

D. Steel Pipe: Material and Grade per drawings.

E. Welding Electrodes: Comply with AWS requirements.

2.4 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: Material and Grade per drawings.

2.5 PRIMER

A. Steel Primer:

1. Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings." Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

B. Galvanized-Steel Primer: MPI#26 MPI#80, MPI#134.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 ASTM A780/A780M.

2.6 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize the following:

a. Lintels and shelf angles attached to structural-steel frame and located in exterior walls.
b. Structural-steel items indicated on the Drawings.

2.10 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Corrosion-resisting (weathering) steel surfaces.
7. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7 (WAB)/NACE WAB-4.
4. SSPC-SP 14 (WAB)/NACE WAB-8.
5. SSPC-SP 11.
6. SSPC-SP 6 (WAB)/NACE WAB-3.
7. SSPC-SP 10 (WAB)/NACE WAB-2.
8. SSPC-SP 5 (WAB)/NACE WAB-1.
9. SSPC-SP 8.

C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner or in accordance with SSPC-SP 16.

D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E165/E165M.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    c. Ultrasonic Inspection: ASTM E164.
    d. Radiographic Inspection: ASTM E94/E94M.

4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:

    a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
    b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.

5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with ANSI/AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 REPAIR

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1) Liquid Penetrant Inspection: ASTM E165/E165M.
2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3) Ultrasonic Inspection: ASTM E164.
4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. LH series long-span steel joists.
2. Steel joist accessories.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for installing bearing plates in unit masonry.

1.2 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Manufacturer certificates.

C. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.7 SEQUENCING

A. Deliver steel bearing plates to be built into masonry construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Canam Steel Corporation; Canam Group, Inc.
2. CMC Joist & Deck.
3. Gooder-Henrichsen Co.
4. New Millennium Building Systems, LLC.
5. Structures of U.S.A., Inc.
6. Valley Joist.
7. Vulcraft; Nucor Vulcraft Group.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated on Drawings.

1. Use ASD; data are given at service-load level.
2. Design special joists to withstand design loads with live-load deflections no no greater than the following.

    a. Roof Joists: Vertical deflection as indicated on the Drawings .

2.3 STEEL JOISTS

A. Long-Span Steel Joist: Manufactured steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated on Drawings.

1. Joist Type: LH-series long-span steel joists.
2. End Arrangement: Underslung.
3. Top-Chord Arrangement: Parallel.
4. Camber long-span steel joists if required according to SJI's "Specifications.".
5. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Primer:

1. SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

    a. Color: Manufacturer's standard.

2.5 STEEL JOIST ACCESSORIES

A. Bridging:

1. Provide bridging anchors and number of rows of bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
2. Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
3. Fabricate as indicated on Drawings and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

B. Fabricate steel bearing plates from ASTM A36/A36M steel with integral anchorages of sizes and thicknesses indicated on Drawings. Shop prime paint.

C. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

D. Welding Electrodes: Comply with AWS standards.

E. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 REPAIRS

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Touchup Painting:

1. Immediately after installation, clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joistsabutting structural steel, and accessories.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
b. Apply a compatible primer of same type as primer used on adjacent surfaces.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E165/E165M.
b. Magnetic Particle Inspection: ASTM E709.
c. Ultrasonic Testing: ASTM E164.
d. Radiographic Testing: ASTM E94.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

END OF SECTION

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Acoustical roof deck.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Roof deck.
2. Acoustical roof deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

    a. Power-actuated mechanical fasteners.
    b. Acoustical roof deck.

2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1/D1.1M.
2. AWS D1.3/D1.3M.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.2 ROOF DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASC Profiles, Inc.
2. Canam Steel Corporation; Canam Group, Inc.
3. Cordeck.
4. DACS, Inc.
5. Epic Metals Corporation.
6. Marlyn Steel Decks, Inc.
7. New Millennium Building Systems, LLC.
8. Nucor Corporation.
9. Roof Deck, Inc.
10. Valley Joist.
11. Vulcraft; Nucor Corporation, Verco Group.

B. Fabrication of Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:

1. Galvanized- and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33 (minimum), G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: White.

2. Deck Profile: As indicated .
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated .
5. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
6. Span Condition: Triple span or more.
7. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACOUSTICAL ROOF DECK

A. Basis-of-Design Product: Subject to compliance with requirements, provide Vulcraft 3.5DA ACOUSTICAL DOVETAIL ROOF DECK or comparable products by one of the following:

1. ASC Profiles, Inc.
2. Canam Steel Corporation; Canam Group, Inc.
3. Cordeck.
4. DACS, Inc.
5. Epic Metals Corporation.
6. Marlyn Steel Decks, Inc.
7. New Millennium Building Systems, LLC.
8. Nucor Corporation.
9. Roof Deck, Inc.

B. Fabrication of Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:

1. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 40, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: White.

2. Deck Profile: As indicated.
3. Cellular Deck Profile: As indicated , with bottom plate.
4. Profile Depth: 3-1/2 inches .
5. Design Uncoated-Steel Thickness: As indicated .
6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
7. Span Condition: Triple span or more.
8. Side Laps: Overlapped or interlocking seam at Contractor's option.
9. Acoustical Perforations: Cellular deck units with manufacturer's standard perforated flat-bottom plate welded to ribbed deck.
10. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.

a. Factory install sound-absorbing insulation into cells of cellular deck.

11. Acoustical Performance: NRC 0.65, tested in accordance with ASTM C423.

2.4 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

F. Galvanizing Repair Paint: ASTM A780/A780M.

G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Space welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or fasteners not more than 12 inches apart with at least one weld or fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten following locations indicated on Structural Drawings.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions and as indicated on Structural Drawings. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.

3.4 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

a. Repair painting to include any burned or darkened surfaces due to welding left exposed to view.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections: As indicated on Drawings.

1. Steel decking will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Exterior non-load-bearing wall framing.
2. Vertical deflection clips.
3. Double deflection track.
4. Drift clips.
5. Power-actuated anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated Design Submittal: For cold-formed steel framing.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ClarkDietrich.
2. Custom Stud.
3. Jaimes Industries.
4. MarinoWARE.
5. MBA Building Supplies.
6. MRI Steel Framing, LLC.
7. Olmar Supply, Inc.
8. SCAFCO Steel Stud Company.
9. Southeastern Stud & Components, Inc.
10. Steel Construction Systems.
11. Steel Structural Systems.
12. Steeler, Inc.
13. Telling Industries.
14. United Steel Deck, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

    a. Upward and downward movement of 1/2 inch.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and ASTM C955.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

A. Framing Members, General: Comply with ASTM C955 for conditions indicated.

B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: ST33H.
2. Coating: G90 or equivalent.

C. Steel Sheet for Drift Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50, Class 1.
2. Coating: G90.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch .
2. Flange Width: 1-3/8 inches.
3. Section Properties: As rquired for performance requirements.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch .
2. Flange Width: 1-1/4 inches.

C. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: 0.0329 inch .
b. Flange Width: 1 inch plus the design gap for one-story structures.

D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Hole-reinforcing plates.
10. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: MIL-P-21035B or SSPC-Paint 20.

B. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

C. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.8 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing 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. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install double deep-leg deflection tracks and anchor outer track to building structure.
2. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Metal ladders.
3. Metal bollards.
4. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. Related Requirements:

1. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

1.2 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
2. Metal ladders.
3. Metal bollards.
4. Loose steel lintels.

C. Delegated Design Submittals: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders .

B. Structural Performance Ladders: Ladders, including landings, are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Pipe: ASTM A53/A53M, Standard Weight unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

E. Post-Installed Anchors: chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Furnish inserts for units installed after concrete is placed.

C. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch- diameter, steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Source Limitations: Obtain nonslip surfaces from single source from single manufacturer.
7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.

8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
9. Galvanizeexterior ladders, including brackets.

2.8 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

B. Galvanize and prime steel bollards.

2.9 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

2.10 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.11 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for ceiling hung sports equipment securely to, and rigidly brace from, building structure.

3.3 INSTALLATION OF METAL LADDERS

A. Secure ladders to adjacent construction with the clip angles attached to the stringer.

B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.4 INSTALLATION OF METAL BOLLARDS

A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

B. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.5 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.6 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rooftop equipment bases and support curbs.
2. Wood blocking, cants, and nailers.
3. Engineered lumber framing system for parapet caps.
4. Plywood backing panels.

B. Related Sections:

1. Section 072200 "Nailbase Insulation Panels" for insulated nailbase wall sheathing.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. For engineered products, submit project specific details, profiles, and installation instructions

1.4 QUALITY ASSURANCE

A. AWPA Standards: Engineered blocking materials shall meet AWPA U1-15 for Use Category UC 2. Service conditions for UC2 are interior construction, above ground, damp; protected from weather, but may be subject to sources of moisture.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:

1. Concealed blocking.
2. Roof framing and blocking.
3. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
4. Plywood backing panels.

2.3 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. Parapet cap nailer

    a. Contractor's option: Conventional lumber or Engineered blocking.

4. Rooftop equipment bases and support curbs.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:

1. Mixed southern pine or southern pine; SPIB.
2. Spruce-pine-fir; NLGA.
3. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:

1. Mixed southern pine or southern pine, No. 2 grade; SPIB.

2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

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.

2.4 ENGINEERED BLOCKING

A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.

B. Basis-of-Design product: Subject to compliance with the requirements provide PreBuck Parapet Cap Engineered Framing Systm or comparable products by one of the following:

1. Pre-approved equivalent.

C. Parapet Cap Engineered Framing System shall comply with the following:

1. Meets AWPA U1-15 for Use Category 2 (UC2).
2. Pre-drilled round 1-1/4 inch counter sunk anchor openings at 24 inches O.C.
3. Profiles: As indicated on Drawings, build up multiple layers as required.
4. Materials:

a. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559

1) Bending Strength: 1900 psi.
2) Tensile Strength: 1075 psi.
3) Shear Strength: 150 psi.
4) Compression - Perpendicular to Grain: 670 psi.

b. Treatment: Zinc borate through complete cross section.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.

D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2.

2.7 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Coordinate construction sequence with installation of flashings and adjacent materials provided by others to prevent exterior moisture from entering or passing through completed assemblies.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

E. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

G. Do not splice structural members between supports unless otherwise indicated.

H. 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 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.

I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied, emulsified-asphalt dampproofing.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for mortar parge coat on masonry surfaces.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 FIELD CONDITIONS

A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BASF Corporation; Construction Systems.
2. Brewer Company (The).
3. ChemMasters, Inc.
4. Euclid Chemical Company (The); an RPM company.
5. Henry Company.
6. W. R. Meadows, Inc.

B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

2.4 AUXILIARY MATERIALS

A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

C. Asphalt-Coated Glass Fabric: ASTM D 1668/D 1668M, Type I.

D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.

B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.

B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.

D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.

1. Apply dampproofing to provide continuous plane of protection.
2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

B. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.

1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Masonry Backup for Brick Veneer and Rainscreen Assemblies : Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft..

3.5 PROTECTION

A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

B. Related Requirements:

1. Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.
2. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to 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 foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type X (Rigid Insulation, Vertical applications): ASTM C578, Type X, 15-psi minimum compressive strength; unfaced.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. MBCI.
d. Owens Corning.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

B. Extruded Polystyrene Board Insulation, Type VII (Rigid Insulation, Horizontal applications): ASTM C578, Type VII, 60-psi minimum compressive strength.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Kingspan Insulation Limited.
d. Owens Corning.

2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Kraft Faced (Fiberglass Batt): ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Johns Manville; a Berkshire Hathaway company.
    c. Knauf Insulation.
    d. Owens Corning.

2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
    1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:

    1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
    2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.
3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install 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 the cavities, 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 not rated for or protected from contact with insulation.
4. Attics: 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 blankets according to ASTM C1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

    a. Exterior Walls: Set units with facing placed toward interior of construction.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions in small gaps and tight spaces where Glass-Fiber Insulation cannot be installed.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. 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

SECTION 072200 – NAILBASE INSULATION PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nailbase insulated sheathing.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for plywood backing panels.
2. Section 072500 "Weather Barriers" for water-resistive barrier applied over nailbase wall sheathing.

1.2 REFERENCES

A. ASTM C 209 - Methods of Testing Insulating Board, Structural and Decorative.

B. ASTM C 1289 - Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.

C. ASTM D 1621 - Test Methods for Compressive Properties of Rigid Cellular Plastics.

D. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

E. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.

F. PS2-92 - Performance Standard for Wood-based Structural-use Panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier, installation, special details, protection, and work scheduling.

1.4 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets on nailbase insulation panels and fasteners to be used, including:

1. Data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.

2. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
3. Molded (expanded) polystyrene foam-plastic board insulation.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Fire-retardant-treated plywood.
2. Foam-plastic sheathing.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures polyisocyanurate insulation panels and fully assembles ventilated nailbase insulation in-house with no outside fabrication operations.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in accordance with the manufacturer recommendations.

B. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1. For on-site storage longer than two weeks, slit packaging on 4 sides to allow the product to breathe, and then completely covered with a breathable tarpaulin.

C. Protect insulation from open flame and keep dry at all times.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of nailbase insulation panels to be performed according to manufacturers' written instructions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Foam Core Shall Comply With The Following:

1. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type V, 25 psi minimum, Grade 3.
2. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).

3. Moisture Vapor Transmission: ASTM E 96, < 1 perm.
4. Water Absorption: ASTM C 209, < 1 percent by volume.
5. Service Temperature: Minus 100 degrees to 250 degrees F.
6. Foam core flame spread index of 25 or less and smoke developed of 450 or less when tested in accordance with ASTM E 84.
7. Foam Core R Values: Based on Long Term Thermal Resistance in accordance with ASTM C 1289.
8. Polyisocyanurate foam insulation shall conform to ASTM C 1289, Type V.
9. Compressive Strength: 25 pounds per square inch Grade 3

B. Wood Panel Products Shall Comply With The Following:

1. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

    a. Use treatment that does not promote corrosion of metal fasteners.
    b. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

2. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
3. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency acceptable to authorities having jurisdiction.

2.2 NAILBASE INSULATED WALL SHEATHING

A. General: Panels shall consist of a top layer of APA rated Plywood, and a bottom layer of polyisocyanurate foam insulation.

B. Basis-of-Design Product: Subject to compliance with the requirements, provide the Carlisle Coatings & Waterproofing, R2+ Base (Class A) Commercial Grade Insulating Nail Base or comparable product by one of the following:

1. Hunter Panels Xci Ply
2. GAF ThermaCal Wall
3. Pre-approved equivalent

C. Plywood-Surfaced, Polyisocyanurate-Foam Sheathing: ASTM C1289, Type V with DOC PS 2, Exposure 1 fire treated plywood on one face.

1. Total system shall be 2 5/8 inches thick, R-12 comprised of the following:

    a. Polyisocyanurate-Foam Thickness: 2 inches.
    b. Plywood Sheathing Thickness: 5/8 inch.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Screws for Fastening Nailbase Insulated Wall Sheathing to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

D. Screws for Fastening Nailase Insulated Wall Sheathing to Masonry: Masonry drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached. Provide washers or plates if recommended by sheathing manufacturer.

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. Arrange joints so that pieces do not span between fewer than three support members.

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. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Coordinate wall 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.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. 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.

G. Apply weather barrier to substrate where indicated prior to the installation.

3.2 NAILBASE INSULATED SHEATHING INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Comply with manufacturer's written instructions.

C. Install panels with the wood (OSB/Plywood) side face up. Place panels in the manufacturers recommended pattern. Only factory assembled panels will be accepted. Fasten panels through the top nailable surface using manufacturer’s approved threaded fasteners.

D. Fastening Methods: Fasten panels as indicated below:

1. Nailbase Insulated Wall Sheathing:

a. Screw to cold-formed metal framing.
b. Screw to masonry substrate.
c. Space panels 1/8 inch apart at edges and ends.

E. Install base flashing for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.

3.3 PROTECTION

A. Protect installed products until completion of project as required by manufacturer.

B. Cover the top and edges of unfinished wall panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of exterior wall covering.

END OF SECTION

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building paper.
2. Flexible flashing.

B. Related Sections:

1. Specification Section 071113, "Bituminous Dampproofing" for membranes applied directly to CMU for use as a weather barrier.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper that complies with ICC-ES AC38, Grade D; except with water-resistance rating not less than 1 hour.

B. Nails and Staples: Product recommended in writing by water-resistive barrier manufacturer and complying with ASTM F 1667.

2.2 FLEXIBLE FLASHING

A. Rubberized-Asphalt Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch .

1. Products: Subject to compliance with requirements, provide one of the following:

a. Advanced Building Products Inc.; Wind-o-wrap.
b. Carlisle Coatings & Waterproofing Inc; CCW-705-TWF Thru-Wall Flashing.

c. Grace Construction Products; W.R. Grace & Co. -- Conn.; Vycor Plus Self-Adhered Flashing.
d. MFM Building Products Corp.; Window Wrap.
e. Polyguard Products, Inc.; Polyguard JT-20 Tape.
f. Sandell Manufacturing Co., Inc; Presto-Seal.

2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier 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.

C. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. 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.
2. Lap flashing over water-resistive barrier at bottom and sides of openings.
3. Lap water-resistive barrier over flashing at heads of openings.
4. 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

SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal composite material (MCM) panels.

1.2 DEFINITIONS

A. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, MCM system Installer, MCM system manufacturer's representative, and installers whose work interfaces with or affects MCM panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to MCM system installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect MCM system.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for system assembly during and after installation.
8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel, system, and accessory.

1. Metal composite material (MCM) panels.

B. Shop Drawings:

1. Include fabrication and installation layouts of MCM system; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
3. Provide signed and sealed drawings, by a qualified design professional in Project jurisdiction, of MCM system showing compliance with performance requirements and design criteria identified for this Project.

C. Samples for Initial Selection: For each type of MCM panel indicated, with factory-applied color finishes.

1. Size: Manufacturers' standard size.

D. Samples for Verification: For each type of MCM systemrequired, with factory-applied color finishes.

1. MCM Panel: One sample, Manufacturers' standard size.

E. Delegated Design Submittals: For MCM system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For MCM panels.

B. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience.

B. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of the type indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, MCM panels, and other manufactured items so as not to be damaged or deformed. Package MCM panels for protection during transportation and handling.

B. Unload, store, and erect MCM panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack MCM panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store MCM panels to ensure dryness, with positive slope for drainage of water. Do not store MCM panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on MCM panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate MCM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of MCM panels that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design MCM system.

B. Structural Performance: MCM systems to withstand the effects of the following loads, based on testing in accordance with ASTM E330/E330M:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E283/E283M at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

E. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1 at the following test pressure:

1. Test Pressure: 6.24 psf.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL COMPOSITE MATERIAL (MCM) WALL PANELS

A. Metal Composite Material (MCM) Wall Panels: Provide MCM panels fabricated from two metal facings bonded to a solid, extruded thermoplastic core.

1. Basis-of-Design Product: Subject to compliance with the requirements, provide ALUCOBOND EasyFix or comparable product by one of the following:

a. ALPOLIC Materials; Mitsubishi Chemical Composites.
b. Arconic.
c. Fairview Architectural North America.

2. Core: FR.
3. Panel Thickness: 0.157 inch.

4. Bond Strength: 22.5 in-lb/in. when tested for bond integrity in accordance with ASTM D1781.
5. Fire Performance: Flame-spread index less than 25 and smoke-developed index less than 450, in accordance with ASTM E84 or UL 723.

B. MCM Panel Materials:

1. Aluminum-Faced Panels: ASTM B209/B209M alloy as standard with manufacturer, temper as required to suit finish and forming operations with 0.020-inch- thick, aluminum sheet facings.

a. Exterior Finish: Two-coat fluoropolymer.

1) Colors: Equal to Alucobond Azure Blue.

2.3 ACCESSORIES

A. Metal Subframing and Furring: ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.

B. System Accessories: Provide components required for a complete, weathertight wall system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Use gasketed or approved coated fasteners between dissimilar metals.

1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
2. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM system manufacturer.

2.4 FABRICATION

A. Fabricate and finish MCM panels at the factory, by panel manufacturer's standard procedures and processes, as necessary to fulfill indicated panel performance requirements demonstrated by laboratory testing.

B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal manufacturer for application, but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted 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 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.

C. Coil-Coated Metal Finish:

1. PVDF Fluoropolymer: AAMA 2605, two-coat fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM system supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM system manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM system manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating MCM system to verify actual locations of penetrations relative to seam locations of MCM panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF MCM SYSTEM

A. General: Install MCM system in accordance with system manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM system securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving MCM system.
2. Flash and seal MCM system at perimeter of all openings. Fasten with self-tapping screws.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as MCM system work proceeds.
6. Align bottoms of MCM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
7. Provide weathertight escutcheons for all items penetrating system.
8. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by MCM system manufacturer.
9. Attach MCM panels to supports at locations, spacings, and with fasteners recommended by manufacturer to meet listed performance requirements.

B. Attachment Assembly, General: Install attachment assembly required to support MCM panels and to provide a complete weathertight wall system, including tracks, drainage channels, anchor channels, perimeter extrusions, and panel clips.

1. Install subframing, furring, and other panel support members and anchorages in accordance with ASTM C955.
2. Install support system at locations, at spacings, and with fasteners recommended by MCM system manufacturer to meet listed performance requirements.

C. Install panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.

D. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install accessory components required for a complete MCM system assembly including trim, copings, corners, seam covers, flashings, sealants, fillers, closure strips, and similar items. Provide types indicated by MCM system manufacturer.

E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.3 INSTALLATION TOLERANCES

A. Shim and align MCM panels within installed tolerance of 1/4 inch in 20 ft., non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING

A. Remove temporary protective coverings and strippable films as MCM panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.

B. After installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

3.5 PROTECTION

A. Replace MCM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Accessory roofing materials.
3. Vapor retarder.
4. Roof insulation.
5. Asphalt materials.
6. Walkways.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 077100 "Roof Specialties" for roof edge flashings.
3. Section 077129 "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint assemblies.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
5. Section 221423 "Storm Drainage Piping Specialties" for roof drains.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.3 PREINSTALLATION MEETINGS

A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Construction Manager, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of SPRI's Directory of Roof Assemblies listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with air barrier.

C. Samples for Verification: For the following products:

1. Roof membrane and flashings of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers: A qualified manufacturer that is listed in SPRI's Directory of Roof Assemblies for roofing system identical to that used for this Project.

2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, and other components of roofing system.
2. Warranty Period: [10] [15] [20] [30] <Insert number> years from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and base flashings to withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings to remain watertight.

1. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

B. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

1. Zones and requirements indicated on Drawings.

C. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.

1. Wind Uplift Load Capacity: Zones and requirements indicated on Drawings.

D. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

A. EPDM Sheet: ASTM D4637/D4637M, Type I, nonreinforced, EPDM sheet with factory-applied seam tape.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle SynTec Incorporated.
b. Firestone Building Products.
c. Johns Manville; a Berkshire Hathaway company.
d. Mule-Hide Products Co., Inc.
e. Versico Roofing Systems.

2. Thickness: 45 mils, nominal.
3. Exposed Face Color: Black.
4. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.

2.3 ACCESSORY ROOFING MATERIALS

A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

C. Slip Sheet: Manufacturer's standard, of thickness required for application.

D. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

E. Bonding Adhesive: Manufacturer's standard, water based.

F. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

G. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

1. Provide white flashing accessories for white EPDM membrane roofing.

2.4 VAPOR RETARDER

A. Polyethylene Film: ASTM D4397, 10 mils thick, minimum, with maximum permeance rating of 0.076 perm.

1. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
2. Adhesive: Manufacturer's standard lap adhesive, listed by FM Approvals for vapor retarder application.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured[or approved] by EPDM roof membrane manufacturer, approved for use in SPRI's Directory of Roof Assemblies listed roof assemblies.

B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1 felt facer on both major surfaces.

1. Compressive Strength: 25 psi.

2. Size: 48 by 96 inches.
3. Thickness:

    a. Base Layer: 1-1/2 inches.
    b. Upper Layer: As required for average R-value indicated on Drawings.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:

    a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
    b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.6 INSULATION ACCESSORIES AND COVER BOARD

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.
2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
3. Adhesives and sealants shall comply with the following limits for VOC content:

    a. Plastic Foam Adhesives: 50 g/L.
    b. Gypsum Board and Panel Adhesives: 50 g/L.
    c. Multipurpose Construction Adhesives: 70 g/L.
    d. Fiberglass Adhesives: 80 g/L.
    e. Contact Adhesives: 80 g/L.
    f. PVC Welding Compounds: 510 g/L.
    g. Other Adhesives: 250 g/L.
    h. Single-Ply Roof Membrane Sealants: 450 g/L.
    i. Nonmembrane Roof Sealants: 300 g/L.
    j. Sealant Primers for Nonporous Substrates: 250 g/L.
    k. Sealant Primers for Porous Substrates: 775 g/L.

2.7 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D312/D312M, Type III or Type IV.

B. Asphalt Primer: ASTM D41/D41M.

2.8 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSTALLATION OF VAPOR RETARDER

A. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.

1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
2. Continuously seal side and end laps with [tape] [adhesive].

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.5 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.

a. Locate end joints over crests of decking.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch with insulation.
f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.

1) Fasten insulation according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
2) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
b. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
d. Make joints between adjacent insulation boards not more than 1/4 inch in width.
e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
f. Trim insulation so that water flow is unrestricted.
g. Fill gaps exceeding 1/4 inch with insulation.
h. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
i. Adhere each layer of insulation to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:

1) Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
2) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
3) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll membrane roof membrane and allow to relax before installing.

C. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

E. Apply roof membrane with side laps shingled with slope of roof deck where possible.

F. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape.

1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
2. Apply lap sealant and seal exposed edges of roofing terminations.

G. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

H. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

I. Adhere protection sheet over roof membrane at locations indicated.

3.7 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Install flexible walkways at the following locations:

a. Perimeter of each rooftop unit.
b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
d. Top and bottom of each roof access ladder.
e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.

f. Locations indicated on Drawings.
g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof-edge specialties.
2. Roof-edge drainage systems.
3. Reglets and counterflashings.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 074213.23 "Metal Composite Material Wall Panels" for roof-edge specialties integral to wall panels.
3. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.2 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 roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.

5. Include details of special conditions.

C. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are SPRI ES-1 tested to specified design pressure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations 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.

2.2 ROOF-EDGE SPECIALTIES

A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ATAS International, Inc.
b. Berridge Manufacturing Company.
c. Castle Metal Products.
d. Cheney Flashing Company.
e. Drexel Metals; Carlisle Construction Materials.
f. Merchant and Evans.
g. Metal-Era, Inc.
h. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.040 inch thick.

a. Surface: Smooth, flat finish.
b. Finish: Two-coat fluoropolymer .

c. Color: Custom color as required to match Fiberglass Sandwich-Panel Assembly mullions.

3. Corners: Factory mitered and soldered.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

2.3 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. ATAS International, Inc.
2. Berger Building Products, Inc.
3. Castle Metal Products.
4. Cheney Flashing Company.
5. Drexel Metals; Carlisle Construction Materials.
6. Merchant and Evans.
7. Metal-Era, Inc.
8. SAF (Southern Aluminum Finishing Company, Inc.).

B. Downspouts: Plain rectangular complete with [machine-crimped] [mitered] [smooth-curve] elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Formed Aluminum: 0.040 inch thick.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.

1. Formed Aluminum: 0.032 inch thick.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim,.

1. Formed Aluminum: 0.032 inch thick.

E. Aluminum Finish: Two-coat fluoropolymer .

1. Color: Custom color as required to match Metal Composite Wall Panels.

2.4 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ATAS International, Inc.

2. Berridge Manufacturing Company.
3. Castle Metal Products.
4. Cheney Flashing Company.
5. Fry Reglet Corporation.
6. Heckmann Building Products, Inc.
7. Keystone Flashing Company, Inc.
8. Metal-Era, Inc.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Formed Aluminum: 0.024 inch thick.
2. Corners: Factory mitered and soldered.
3. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Formed Aluminum: 0.024 inch thick.

D. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. Aluminum Finish: Two-coat fluoropolymer .

1. Color: As selected from Manufacturer's standard colors.

2.5 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.6 UNDERLAYMENT MATERIALS

A. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. minimum.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

B. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.8 FINISHES

A. 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.

B. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[for seacoast and severe environments].
b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

3.3 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 077129 - MANUFACTURED ROOF EXPANSION JOINTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Flanged bellows-type roof expansion joints.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof expansion joints.

1. Include plans, elevations, sections, and attachment details.
2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

1.5 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS

A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch- wide metal flange.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
    b. Balco; a CSW Industrials Company.
    c. BASF Corp. - Watson Bowman Acme Corp.
    d. Inpro Corporation.
    e. Johns Manville; a Berkshire Hathaway company.
    f. Nystrom.

2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.
3. Joint Movement Capability: Plus and minus 25 percent of joint size.
4. Bellows: Neoprene flexible membrane, nominal 60 mils thick.
5. Flanges: Galvanized steel, 0.022 inch thick .
6. Configuration: Flat to fit cants as indicated on Drawings.
7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
8. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
9. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the primary bellows assembly.

    a. Thermal Insulation: Fill space above secondary seal with mineral-fiber blanket insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.

B. Materials:

1. Galvanized-Steel Sheet: ASTM A653/A653M, hot-dip zinc-coating designation G90.
2. Neoprene Membrane: Neoprene sheet recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil; and as standard with roof-expansion-joint manufacturer for application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for handling and installing roof expansion joints.

1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
3. Provide for linear thermal expansion of roof-expansion-joint materials.
4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
5. Provide uniform, neat seams.
6. Install roof expansion joints to fit substrates and to result in watertight performance.

B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.

C. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.

1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:

a. Penetrations in fire-resistance-rated walls.
b. Penetrations in horizontal assemblies.

1.2 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.5 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Approval in its "Approval Guide."
4) <Insert name of qualified testing and inspecting agency>.

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Grabber Construction Products.
c. Hilti, Inc.
d. STC Sound Control.
e. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

E. Manufactured Piping Penetration Firestopping System: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections:

1. Section 042000 "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Section 088000 "Glazing" for glazing sealants.
3. Section 092900 "Gypsum Board" for sealing perimeter joints.
4. Section 093000 "Tiling" for sealing tile joints.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:

    a. Each kind of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

    a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 ACTION 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. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

C. Field-Adhesion Test Reports: For each sealant application tested.

D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

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. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish 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 joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
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 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 joint-sealant manufacturer, based on testing and field experience.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where 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. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where 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.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

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. Dow Corning Corporation; 795.
b. GE Advanced Materials - Silicones; SilPruf NB SCS9000.
c. Pecora Corporation; 895.
d. Sika Corporation, Construction Products Division; SikaSil-C995.
e. Tremco Incorporated; Spectrem 2.

B. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

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. Dow Corning Corporation; 786 Mildew Resistant.
b. GE Advanced Materials - Silicones; Sanitary SCS1700.
c. Tremco Incorporated; Tremsil 200 Sanitary.

2.3 URETHANE JOINT SEALANTS

A. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.

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. Pecora Corporation; Dynatred.
b. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
c. Tremco Incorporated; Vulkem 227.

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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. Bostik, Inc.; Chem-Calk 600.
b. Pecora Corporation; AC-20+.
c. Tremco Incorporated; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pecora Corporation; AC-20 FTR.
b. Tremco; Tremco Acoustical Sealant
c. USG Corporation; SHEETROCK Acoustical Sealant.

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material 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. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 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, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

    a. Whether sealants filled joint cavities and are free of voids.
    b. Whether sealant dimensions and configurations comply with specified requirements.
    c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 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.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

    a. Isolation and contraction joints in cast-in-place concrete slabs.

b. Other joints as indicated.

2. Urethane Joint Sealant: Multicomponent, nonsag, traffic grade, Class 25.
3. Joint-Sealant Color: If applicable; As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Control and expansion joints in unit masonry.
c. Joints in dimension cast stone.
d. Joints between metal panels.
e. Joints between different materials listed above.
f. Perimeter joints between materials listed above and frames of doors windows and louvers.
g. Control and expansion joints in ceilings.
h. Other joints as indicated.

2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50.
3. Joint-Sealant Color: If applicable; As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in stone flooring.
c. Control and expansion joints in tile flooring.
d. Other joints as indicated.

2. Urethane Joint Sealant: Multicomponent, nonsag, traffic grade, Class 25.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Perimeter joints of exterior openings where indicated.
c. Tile control and expansion joints.
d. Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.
e. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
f. Other joints as indicated.

2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated.

2. Joint Sealant: Single component, nonsag, mildew resistant, acid curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Location:

a. Acoustical joints where indicated.
b. Other joints as indicated.

2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

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

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; ASSA ABLOY.
2. Curries Company; ASSA ABLOY.
3. Custom Metal Products.
4. LaForce, Inc.
5. National Custom Hollow Metal Doors & Frames.

6. Pioneer Industries.
7. Republic Doors and Frames.
8. Steelcraft; an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings[and temperature-rise limits] indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.40 deg Btu/F x h x sq. ft. when tested according to ASTM C518.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

1. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch.
    d. Edge Construction: Model 1, Full Flush.
    e. Edge Bevel: Bevel lock edge 1/8 inch in 2 inches.
    f. Core: Manufacturer's standard.
    g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener core for fire-rated doors.

2. Frames:

    a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
    b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.
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1. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A60 coating.
    d. Edge Construction: Model 1, Full Flush.
    e. Edge Bevel: Bevel lock edge 1/8 inch in 2 inches.
    f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
    g. Bottom Edges: Close bottom edges of doors[where required for attachment of weather stripping] with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
    h. Core: Polyisocyanurate.

2. Frames:

    a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
    b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 BORROWED LITES

A. Fabricate of uncoated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.

B. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.7 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.8 FABRICATION

A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
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. Provide loose stops and moldings on inside of hollow-metal doors and frames.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation 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.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with 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 without damage to completed Work.

    a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
    b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames where indicated.
5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, 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 and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 081613 - FIBERGLASS REINFORCED POLYESTER (FRP) DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiberglass Reinforced Polyester Doors.
2. Thermally Broken Aluminum Frames.

B. Related Sections:

1. Section 087100: Door Hardware.
2. Section 088000: Glass and Glazing.

1.2 DEFINITIONS

A. FRP is defined as "Fiberglass Reinforced Polyester".

1.3 REFERENCES

A. ASTM D 523 - Standard Test Method for Specular Gloss.

B. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

F. UL 10B - Standard for Fire Tests of Door Assemblies.

G. Michigan Building Code, Current Edition, Plastics (Chapter 26).

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.5 SOURCE LIMITATIONS

A. Obtain fiberglass reinforced plastic doors and aluminum frames through one source fabricated from a single manufacturer.

B. Due to the special nature of the material in this section, all related hardware as specified must be mounted by the door and frame manufacturer or installer.

1.6 PERFORMANCE REQUIREMENTS

A. Maximum flame spread 25 in accordance with ASTM E 84, self-extinguishing in accordance with ASTM D 635.

B. Fire rated assemblies: Comply with requirements of WHI/UL10B, NFPA 252, and ASTM E 152; UL ratings indicated on drawings, with doors and frames bearing rating labels.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver FRP doors and aluminum frames to site in boxes with foam sheet separations and visible lables clearly identifying opening, door mark, and manufacturer.

B. Upon receipt of shipment, remove and inspect the doors and frames for damage.

C. Store doors indoors in a vertical position, clear of the floor, with blocking between the doors to permit air circulation between the doors and prevent damage to the door faces. Rain/water or condensation must not be allowed to collect or lay between stored doors. Do not wrap in plastic sheeting as it will promote condensation formation within.

D. Use care in handling FRP doors and frames to prevent damage to factory finishes. Wear protective gloves and do not slide or drag doors or frames against one another.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer's 10-year warranty against failure due to corrosion from specified environment.

B. Manufacturer's Special Finish Warranty:

1. Painted face sheets: 5 years.
2. Annodized aluminum frames: 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide SL-17 Doors and Frames as manufactured by Special-Lite, Inc. or comparable products by one of the following

1. Commercial Door Systems.
2. Eliason Corporation
3. Fib-R-Dor.
4. Marlite
5. Oshkosh Door Company, Cor-Guard Standard FRP Door.
6. Simon Door
7. TIGER Door.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10B.

1. Smoke and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

2.3 FRP DOORS AND FRAMES

A. FRP Doors

1. Type: As indicated in the Door and Frame Schedule.
2. Thickness: 1-3/4 inches
3. Construction:

a. Core:

1) Standard Core: Resin impregnated, manufacturer's Standard Honeycomb, polyurethane foam or Premium End Grain Balsa Wood.
2) Fire Rated Core: Gypsum.
3) Exterior doors: Manufacturer's standard polystyrene, polyurethane, polyisocyanurate core to meet specified R-value.

a) Thermal Insulating Value: 'R' Value 11 at Foam Core for exterior doors

4) The core for each door is to be completely enclosed within the stile and rail subframe.

b. Stiles & Rails: Aluminum extrusions made from 6063 aluminum alloys with a minimum temper of T5 and one-piece extrusion which have integral reglets to accept face sheet on both interior and exterior side of door which secure face sheet into place and permit flush appearance. All connections shall be chemically welded or interlocking. No mechanical fasteners will be allowed. The use or inclusion of gypsum or wood into stile and rail construction is not permitted.
c. Internal Reinforcement: Manufacturer's standard non-wood or gypsum reinforcing at all hardware locations. A minimum of 900 lbs of pullout strength is required for each factory supplied hinge screw.
d. Face: Door facings shall utilize a chemical resistant modified polyester copolymer resin system with fiber reinforcing layers. Supplier shall furnish door faces as shown on the drawings and in the door elevations. Structural reinforcement of the face skin shall be in the form of random chopped fiberglass roving.

1) Finish and Texture: Manufacturer's standard pebble texture with through color.

e. Corners: Mitered, secured with 3/8” diameter full-width steel tie rod through extruded splines top and bottom which are integral to standard tubular shaped rails

B. Aluminum Frames: Manufacturer's standard thermally broken aluminum framing with applied stops.

1. Perimeter Frame Members:

a. Factory fabricated, storefront type frame with thermally broken pocket filler and four enclosed sides. Open-back framing is not acceptable.
b. Thermal Strut: Fiber reinforced plastic, no other materials will be accepted.

2. Applied Door Stops:

a. 5/8” x 1-1/4” or 5/8” x 1-3/4”, 0.125” wall thickness, with screws and weather-stripping.
b. Provide solid ½” aluminum bar behind door stop for closer shoe attachment.
c. Pressure gasketing for weathering seal.
d. Counterpunch fastener holes in door stop to preserve full-metal thickness under fastener head.

3. Frame Member to Member Connections:

a. Secure joints with fasteners.
b. Provide hairline butt joint appearance.
c. Shear block construction only, no screw spline allowed.

4. Hardware:

    a. Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
    b. Surface mounted closures will be reinforced for but not prepped or installed at factory.
    c. Factory install door hardware.

C. FRP Door and Frame Assembly

1. Operation Cycles: Door and frame components capable of operating for not less than 1,000,000 as tested in accordance with ANSI A250.4.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. General: All fasteners for all hardware shall be type 304 CRSS (18-8 series corrosion resistant stainless steel). No carbon steel or aluminum components shall be used.
2. 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.
3. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
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.

2.5 MATERIALS

A. Fiberglass Mat: Glass fiber chopped strand, minimum 2 ounces per square foot.

B. Aluminum Members:

1. Aluminum extrusions made 6061 or 6063 aluminum alloys.
2. Sheet and plate to conform to ASTM-B209.
3. Alloy and temper to be selected by manufacturer for strength, corrosion resistance, and application of required finish, and control of color.

C. Resins: Manufacturer's formulation for fabricating units to meet specified requirements.

D. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

E. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

F. Frame Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings, and stainless steel masonry tee anchors for new construction.

G. Fasteners: Stainless steel.

H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

I. Glazing: Section 088000 "Glazing."

2.6 FABRICATION

A. Fabricate FRP work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. 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. Fiberglass Reinforced Polyester (FRP) Doors:

1. Minimum glass fiber to resin ratio: 35 percent.
2. Supplier shall furnish manufacturer's standard templates, installation instructions, or full size approved door and frame preparation instructions as approved by the architect and as required by door and frame manufacturer prior to door and frame factory initiated manufacture.

    a. Mortise for lockset, and recess for strike plate in lock stile.
    b. Embed steel reinforcement for hinges in fiberglass matrix; provide for hinge leaf recesses in hinge stile.

C. Fiberglass Reinforced Polyester (FRP) Frames:

1. Frames shall be factory machined and drilled for all hardware requiring mortises, with #12x1" long stainless steel screws pre-installed for hinge attachment.
2. Mortise for lock strike, and recess for strike plate in lock jamb.
3. Reinforce for hinges and other indicated hardware.

D. Factory install door hardware.

E. Hardware:

1. Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and door hardware schedule.
2. Surface mounted closures will be reinforced for but not prepped or installed at factory.

2.7 FINISH

A. Doors: Factory finish in compliance with the following:

1. Color and Gloss: As selected by Architect from manufacturer's full range.
2. Texture: Manufacturer's standard pebble texture.

B. Aluminum Frames:

1. Finish: Clear annodized, Class 1, minimum 0.7 mils thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive work and opening dimensions and clearances are as indicated on approved shop drawings. Do not begin installation until openings have been properly prepared.

B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Acclimate doors and frames to site conditions for a minimum of 24 hours before installation.

B. Do not remove labels from fire-rated doors and frames.

3.3 INSTALLATION

A. Frames: Install in strict accordance with manufacturer's printed instructions. Set plumb and square, using shims for bolt-in of existing openings, or wood bracing prior to grouting of jambs.

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-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 door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
f. Use anchorage devices to securely fasten sliding door assembly to wall construction without distortion or imposed stresses.

2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames as indicated on drawings.
3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
4. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

B. FIBERGLASS REINFORCED POLYESTER DOORS:

1. Site Tolerances: Fit fiberglass reinforced polyester accurately in frames, within clearances specified in manufacturer's printed installation instructions unless more stringent requirements are specified below. Shim as necessary.

   a. Fire-Rated Doors: Install doors with clearances according to NFPA 80
   b. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

2. Hang per manufacturer's printed instructions using special screws provided for hinge attachment. Install doors to swing freely and to stand open at any angle. After installation make final adjustments to hardware to allow for proper door operation and latching. All surface applied hardware shall be thru bolted.

C. Glazing: Factory glazing to comply with installation requirements in Section 088000 "Glazing" and with FRP manufacturer's written instructions.

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 FRP work that is warped, bowed, or otherwise unacceptable.

B. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.

C. Touch-up, repair or replace damaged products before Substantial Completion.

D. Remove grout and other bonding material from FRP work immediately after installation.

END OF SECTION

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for roof hatches.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    c. Larsens Manufacturing Company.
    d. MIFAB, Inc.
    e. Nystrom.

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Optional Features: Piano hinges .
4. Locations: Wall and ceiling in utility and back-of-house areas.
5. Door Size: As required.
6. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory primed.
7. Frame Material: Same material and thickness as door.
8. Latch and Lock: Cam latch, screwdriver operated .

B. Recessed Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    c. Larsens Manufacturing Company.
    d. MIFAB, Inc.
    e. Nystrom.

2. Description: Door face recessed 1/2 inch for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Optional Features: Piano hinges .
4. Locations: Wall and ceiling locations exposed to public view.
5. Door Size: As required.
6. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage, factory primed.
7. Latch and Lock: Cam latch, screwdriver operated .

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Recessed Access Doors with Concealed Flanges :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    c. MIFAB, Inc.

d. Nystrom.

2. Description: Door face flush with frame, uninsulated; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Optional Features: Upward-opening doors for ceilings, Piano hinges.
4. Locations: Fire ratedwall and ceilings.
5. Door Size: As required.
6. Fire-Resistance Rating: Not less than that of adjacent construction.
7. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage, factory primed.
8. Frame Material: Same material, thickness, and finish as door.
9. Latch and Lock: Self-closing, self-latching door hardware, operated by key.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 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 mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.

E. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are 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.

D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, Section 5.2.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated access door indicating compliance with each item listed in NFPA 80.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.
2. Aluminum-framed entrance door systems.

B. Related Section:

1. Section 084418 "Glazed Steel Curtainwall" for fire rated steel curtainwall framing and entrances with aluminum caps.

1.2 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 type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Anchorage.
b. Expansion provisions.
c. Glazing.

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 including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.4 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: Five years from date of Substantial Completion.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E 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, peeling, or chipping.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing, vented windows and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. 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, 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.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

    a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans of less than 11 feet 8-1/4 inches.

E. Structural: Test according to ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and 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.

F. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, 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..

G. 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..
2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.

H. 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.

2.3 STOREFRONT SYSTEMS

A. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated for each of the following types or comparable products by one of the following:

1. CMI Architectural.
2. Commercial Architectural Products, Inc.
3. Coral Industries, Inc.
4. SAFTI FIRST Fire Rated Glazing Solutions.
5. Tubelite Inc.

B. Exterior Framing Members: Manufacturer's extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Basis-of-Design Product: Kawneer 451T-VG
2. Framing Construction: Thermally broken, front glazed.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Front.
5. Finish: Clear anodic finish.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer to comply with design criteria and loading.

C. Interior Framing Members: Manufacturer's extruded or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Basis-of-Design Product: Kawneer 451.
2. Framing Construction: Non-thermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Center.
5. Finish: Clear anodic finish.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer to comply with design criteria and loading.

D. Venting Windows:

1. Manufacturer's standard units, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:

    a. Window Type: As indicated on Drawings.
    b. Minimum Performance Class: CW.
    c. Minimum Performance Grade: 40.
    d. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:

        1) Multi-point locking system.
        2) Rotary operator.
        3) Steel or bronze operating arms.
        4) Limit Devices: Concealed friction adjustor and adjustable stay bar limit devices designed to restrict sash opening.

            a) Limit clear opening to 4 inches for ventilation; with custodial key release.

    e. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
    f. Insect Screens: Provide removable insect screen on each operable exterior sash, with screen frame finished to match window unit, complying with SMA 1004 or SMA 1201, and as follows:

1) Aluminum Wire Fabric: 18-by-18, 0.0445-inch-by-0.0445-inch (1.1-by-1.1-mm); 18-by-16, 0.0445-inch-by-0.0515-inch (1.1-by-1.3-mm); or 18-by-14, 0.0445-inch-by-0.0624-inch (1.1-by-1.5-mm) mesh of 0.013-inch- (0.3-mm-) diameter, coated aluminum wire.

g. Glazing: Same as adjacent aluminum-framed entrances and storefront glazing.
h. Finish: Match adjacent aluminum-framed entrances and storefront finish.
i.

E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Cross Aluminum Products, WS-500 Series doors or comparible products by one of the following:

1. EFCO Corporation.
2. Kawneer North America, an Arconic company.
3. Oldcastle BuildingEnvelope.
4. Tubelite Inc.
5. U.S. Aluminum; a brand of C.R. Laurence.
6. YKK AP America Inc.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.188-inchthick, 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. Door Design: Wide stile; 5-inch nominal width.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

4. Finish: Match adjacent storefront framing finish.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

C. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Comply with Section 088000 "Glazing."

C. Glazing Sealants: Comply with Section 088000 "Glazing."

2.7 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

D. Structural Profiles: ASTM B308/B308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

F. Steel Reinforcement Primer: 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.

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads[, finished to match framing system][, fabricated from 300 series stainless steel].

B. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

C. Rigid PVC Filler.

2.9 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 [exterior] [interior] [interior for vision glass and exterior for spandrel glazing or metal panels].
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 screw-spline system.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

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.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, 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 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. 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.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF OPERABLE UNITS

A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

3.4 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.5 INSTALLATION OF WEATHERSEAL SEALANT

A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass as recommended by sealant manufacturer.

B. Install weatherseal sealant to completely fill cavity, according to sealant manufacturer's written instructions, to produce weatherproof joints.

3.6 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance 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.

3.7 ERECTION TOLERANCES

A. 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.

3.8 MAINTENANCE SERVICE

A. Entrance Door Hardware Maintenance:

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.

END OF SECTION

SECTION 084418 - GLAZED STEEL CURTAIN WALL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-rated curtain door and wall systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of curtain wall framing.

B. Related Sections include the following:

1. Section 078400 – “Firestopping” for perimeter fire-containment systems (safing insulation) field installed with steel fire-rated glazed curtain-wall systems.
2. Section 079200 – “Joint Sealants” for installation of joint sealants installed with steel fire-rated glazed curtain-wall systems and for sealants to the extent not specified in this Section.
3. Section 084313 – “Aluminum Entrance and Storefronts for entrance and storefront systems installed with steel fire-rated glazed curtain-wall systems.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1. AAMA 501.1-2005: Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure
2. AAMA 501.2-2003: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
3. AAMA 501.4-2000 (Revised 2001): Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts
4. AAMA 501.5-2005: Test Method for Thermal Cycling of Exterior Walls
5. AAMA 506-2000 (Revised 2003): Voluntary Specifications for Hurricane Impact and Cycle Testing of Fenestration Products
6. AAMA 1503-1998: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
7. AAMA 2603-2002 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
8. AAMA 2604-2005 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
9. AAMA 2605-2005 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):

1. Fire safety related:

a. ASTM E119: Methods for Fire Tests of Building Construction and Materials.

2. Material related

a. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2007.
b. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2006b.

3. Exterior related

a. ASTM E 283-04: Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen
b. ASTM E 330-02: Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference Procedure A
c. ASTM E 331-04: Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
d. ASTM E 783-02: Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
e. ASTM E 1105-00: Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference

C. American Welding Society (AWS)

1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007

D. National Fire Protection Association (NFPA):

1. NFPA 80: Fire Doors and Windows.
2. NFPA 252: Fire Tests of Door Assemblies
3. NFPA 257: Fire Test of Window Assemblies

E. Underwriters Laboratories, Inc. (UL):

1. UL 9: Fire Tests of Window Assemblies
2. UL 10 B: Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data:

1. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.

B. Shop Drawings:

1. Include plans, elevations and details of product showing component dimensions; framed opening requirements, dimensions, tolerances, and attachment to structure

C. Samples for following products:

1. Glass sample-as provided by manufacturer
2. Sample of frame
3. Verification of sample of selected finish

D. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.

1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualifications according to

1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
2. International Accreditation Service for Testing Body-Building Materials and Systems

a. Fire Testing

1) ASTM Standard E119
2) CPSC Standard 16 CFR 1201
3) NFPA Standards 251, 252, 257
4) UL Standards 9, 10B, 10C, 1784, UL Subject 63
5) BS 476; Part 22: 1987
6) EN 1634-1
7) CAN/ULC Standards S101, S104, S106

B. Environmental Qualifications

1. Living Building Challenge Compliant and Red List Approved

a. Declare label (#AGN-0010)
b. https://declare.living-future.org/products/technical-glass-products-fireframes-curtainwall-series and can be used for building projects seeking to achieve either the Living Building Challenge or LEED green building rating systems.

C. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

D. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

E. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257 and UL 9. For 45-minute fire-rated assemblies only.

F. Fire-Rated Wall Assemblies: Assemblies complying with ASTM E119 that are classified and labeled by UL, for fire ratings indicated, based on testing in accordance with UL 263, ASTM E119.

G. Listing and Labels – Fire-Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle under provisions specified by manufacturer.

1.6 PROJECT CONDITIONS

A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner, coordinate planned measurements with the work of other sections.

1. Note whether field or planned dimensions were used in the creation of the shop drawings

B. Coordinate the work of this sections with others effected including but not limited to: other interior and /or exterior envelope components and door hardware beyond that provided by this section.

1.7 WARRANTY

A. Provide the Pilkington Pyrostop® and the Fireframes® Curtainwall Series standard five-year manufacturer warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with the requirements, provide one of the following:

1. System 1:

a. Glazing Material: “Pilkington Pyrostop " fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com, web site http://www.fireglass.com.
b. Frame System: Fireframes®Curtainwall Series fire-rated steel frame system as supplied by Technical Glass Products 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com web site http://www.fireglass.com.

2. System 2:

a. Glazing Material: (SuperLite®II-XL) (SuperLite®II-XL IGU) (SuperLite®II-XLB) (SuperLite® II-XLM) as manufactured and distributed by SAFTI FIRST®Fire Rated Glazing Solutions. 100 N Hill Drive, Suite 12, Brisbane, CA 94005; Telephone 888.653. 3333; Fax 888.653.4444; email info@safti.co; Web site www.safti.com
b. Framing System: GPX Architectural Series Framing as manufactured and distributed by SAFTI FIRST®Fire Rated Glazing Solutions. 100 N Hill Drive, Suite 12, Brisbane, CA 94005; Telephone 888.653. 3333; email info@safti.co; Web site www.safti.com

B. Substitutions: Substitutions for Glazing Material and Frame System not permitted.

2.2 PERFORMANCE REQUIREMENTS

A. System Description:

1. Steel fire-rated glazed curtain wall system, outside glazed pressure plate, cover cap format.
2. Face Widths Available:

a. 2 3/8-inch wide.

3. Water Drainage:
4. System is vertically weeped. No joint plugs or weep holes at horizontal mullions. Horizontal gaskets are notched and received by vertical gaskets.

B. Structural Performance

1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration.
2. Positive wind load: as indicated on the drawings
3. Negative wind Load:as indicated on the drawings
4. Member deflection: Limit deflection of the edge of the glass normal to the plane of the glass to 1/175 of the glass edge length or ¾ inch, whichever is less
5. Accommodate movement between storefront and adjoining systems

C. Air Infiltration: ASTM E 283; Air infiltration rate shall not exceed 0.06 cfm/ft^2 at a static air pressure differential of 6.24 psf.

D. Water Resistance, (static): ASTM E 331; No leakage at a static air pressure differential of 15 psf as defined in AAMA 501.

E. Water Resistance, (dynamic): AAMA 501.1; No leakage at an air pressure differential of 15 psf as defined in AAMA 501.

F. Thermal Movements: Provide steel fire-rated glazed curtain-wall systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. 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.

2.3 MATERIALS - GLASS

A. Low-E Coated glass for use in insulated exterior units See Section 088000. See chart below for Low-E configurations.

B. Use the paragraph above to specify the low-e coated glass in Section 088000 and use the paragraph below to select glass available from Technical Glass Products. Other manufacturer’s glass will need to be shipped to Technical Glass Products for incorporation into insulated unit.

C. Not all Low-E coated glass by all manufacturers is available for assembly by others into insulated units. Consult with low-e glass manufacturer about availability of their low-e product for shipment to Technical Glass Products for inclusion into insulated units.

D. Fire Rated Glazing: Composed of multiple sheets of Pilkington “Optiwhite™” high visible light transmission glass laminated with an intumescent interlayer.

E. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

F. Adjust list of thicknesses below to suit Project -- these are listed in tabular form delete those columns not used.

G. Properties Interior Glazing

Property				
Fire Rating	*45 minute*	*60 minute*		*120 minute*
Manufacturer's *designation*	*45-200*	*60-101*	*60-201*	*120-104*
Glazing type	*single*	*single*	*single*	*IGU*
Nominal Thickness	***3/4"*** *(19mm)*	***7/8"*** *(23mm)*	***1-1/16"*** *(27mm)*	*2-1/8 (54mm) [with 8* ***mm spacer, or 2-3/8"*** *(60 mm) with 14 mm spacer]*
Weight in lbs/sf	*9.2*	*10.85*	*12.5*	*21.7*
Daylight Transmission	*86%*	*87%*	*86%*	*75%*
Sound Transmission Coefficient	*40dB*	*41dB*	*44dB*	*46dB*

H. Properties Exterior Glazing

Property	*45 minute*		*60 minute*		*120 minute*
*Manufactur **er's** designation*	*45-200*	*45-260 45-360*	*60-20 1*	*60-261 60-361**	*120-262 120-362**
Glazing type	*single*	*IGU*	*single*	*IGU*	*IGU*
Nominal Thickness	***3/4"***	***1-5/16"***	*1-1/16 „*	***1-5/8"***	*2-3/8"*
Weight in lbs/sf	*9.2*	*12.5*	*12.5*	*15.8*	*22.1*
Daylight Transmissi on	*86*	*77*	*86%*	*77%*	*74%*
		59-71		*59-70%*	*33-68%*
Sound Transmissi on Coefficient	*40dB*	*40dB*	*44dB*	*44dB*	*46dB*

1. * Low-E product.

I. Exterior Grade: PVB inner layer installed toward exterior.

J. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.

K. Glazing Accessories: Manufacturer's standard compression gaskets, spacers, setting blocks and other accessories necessary for a complete installation.

2.4 MATERIALS –STEEL FRAMING

A. Steel Curtainwall Framing System 45 min.

1. Frame: [Steel]: profiled steel tubing permanently joined with steel bolts.

2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant
3. Fasteners: Type recommended by manufacturer
4. Glazing Gaskets, Compounds and tapes: Glaze Pilkington Pyrostop glass with approved EPDM glazing gaskets and [closed cell PVC tape], or [pure silicone sealant].
5. Steel Pressure Plates: Formed stainless steel pressure plate with dimensions recommended by manufacturer to securely hold glazing material in place.
6. Cover Caps: Formed extruded aluminum.

B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.

C. Steel Reinforcement: With manufacturer's standard 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.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M Standard Specification for Carbon Structural Steel
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable
3. Hot-Rolled Sheet and Strip: 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

D. Brackets and Reinforcements: Manufacturer's standard high-strength materials with nonstaining, nonferrous shims for aligning system components.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.

F. Anchors: Three-way adjustable anchors 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.

G. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

2.5 DOOR HARDWARE

A. Hardware shall be supplied with the fire door. Hardware selection shall be from door manufacturer's standard recommended hardware groups as specified below. Please call manufacturer for custom hardware.

2.6 ACCESSORIES

A. Exposed Fasteners: Use fasteners fabricated from Type 304 or Type 316 stainless steel.

B. Glazing Gaskets:

1. Glazing gaskets for interior or exterior applications: ASTM C 864 (extruded EPDM rubber that provides for silicone adhesion) or ASTM C1115 Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories (extruded silicone).

C. Intumescent Tape: As supplied by frame manufacturer.

D. Setting Blocks: ¼" Calcium silicate.

E. Perimeter Anchors: Steel or 316 Stainless steel when exposed.

F. Flashings: As recommended by manufacturer; same material and finish as cover caps.

G. Silicone Sealant: One-Part Low Modulus, neutral cure High Movement-Capable Sealant: Type S; Grade NS; Class 25 with additional movement capability of 100 percent in extension and 50 percent in compression (total 150 percent); Use (Exposure) NT; Uses (Substrates) M, G, A, and O as applicable. (Use-O joint substrates include: Metal factory-coated with a high-performance coating; galvanized steel; ceramic tile.)

1. Available Products:

a. Dow Corning 790, 795 - Dow Corning Corp.
b. Momentive
c. Tremco

H. Intumescent Caulk: Single component, latex-based, intumescent caulk designed to stop passage of fire, smoke, and fumes through fire-rated separations; permanently flexible after cure; will not support mold growth; flame spread/smoke developed 10/10.

1. Available Products:
2. 3M CP-25 WP+.

2.7 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER INSULATION

A. Available Manufacturers:

1. Fibrex Insulations Inc.
2. Owens Corning
3. Thermafiber
4. Rockwool

B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:

1. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
2. Fiber Color: Regular color, unless otherwise indicated.

2.8 FABRICATION

A. General:

1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly yet enabling installation and dynamic movement of perimeter seal.
2. Accurately fit and secure joints and corners. Make joints flush and weatherproof.
3. Prepare components to receive anchor devices.
4. Provide physical and thermal isolation of glazing from framing members.
5. Provide internal guttering to drain water from joints and condensation occurring within glazing pocket.
6. Fabricate anchors.
7. Arrange fasteners and attachments to be concealed from view.

B. Guttered System Components:

1. Fabricate components to resist water penetration as follows:

a. Internal guttering system or other means to drain water passing joints, occurring within framing members, and moisture migrating within glazed steel curtain walls.
b. Pressure-equalized system, double barrier, or two lines of air and water resistance design with primary air and water barrier at interior side of glazing pocket.

2.9 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive curtain wall system and sill plate is level in accordance with manufacturer's acceptable tolerances.

B. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.

C. Do not proceed until such conditions are corrected.

3.2 INSTALLATION

A. Install per manufacturer's tested assembly requirements.

3.3 PROTECTION AND CLEANING

A. Protect glass from damage immediately after installation by attaching crossed streamers to framing held away from the glass. Do not apply markers to the glass surface. Remove nonpermanent labels, and clean surfaces.

1. Do not clean with astringent cleaners. Use a clean "grit free cloth and a small amount of mild soap and water or mild detergent.
2. Do not use any of the following:

a. Steam jets
b. Abrasives
c. Strong acidic or alkaline detergents, or surface-reactive agents
d. Detergents not recommended in writing by the manufacturer
e. Do not use any detergent above 77 degrees F
f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
g. Metal or hard parts of cleaning equipment must not touch the glass surface

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 them immediately as recommended by glass manufacturer.

C. 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 by glass manufacturer.

END OF SECTION

SECTION 084523 - FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum-framed assemblies incorporating fiberglass-sandwich panels as follows:

1. Wall assemblies.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

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 aluminum components of panel assemblies.

B. Shop Drawings: For panel assemblies.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.

C. Fabrication Samples: Of each framing system intersection and adjacent panels, made from 12-inch lengths of full-size framing members and showing details of the following:

1. Joinery.
2. Anchorage.
3. Expansion provisions.
4. Fiberglass-sandwich panels.
5. Flashing and drainage.

D. Delegated Design Submittals: For panel assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For panel assemblies to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: For fiberglass-sandwich panels, a qualified manufacturer whose facilities, processes, and products are monitored by an independent, accredited quality-control agency for compliance with applicable requirements in ICC-ES AC04 or ICC-ES AC177.

B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of panel assemblies 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. Deterioration of metals[, metal finishes,] and other materials beyond normal weathering.
    c. Water leakage.

2. Warranty Period: Five years from date of Substantial Completion.

B. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace fiberglass-sandwich panels that exhibit defects in materials or workmanship within specified warranty period.

1. Defects include, but are not limited to, the following:

    a. Fiberbloom.
    b. Delamination of coating, if any, from exterior face sheet.
    c. Color change exceeding requirements.
    d. Delamination of panel face sheets from panel cores.

2. Warranty Period: 10 years from date of Substantial Completion.

C. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.

1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design fiberglass-sandwich-panel assemblies.

B. Structural Loads: As indicated on Drawings.

C. Deflection Limits:

1. Vertical Panel Assemblies: Limited to 1/60 of clear span for each assembly component.

D. Structural-Test Performance: Provide panel assemblies tested in accordance with ASTM E330, as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not show evidence of deflection exceeding specified limits.
2. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Water Penetration under Static Pressure: Provide panel assemblies that do not evidence water penetration through fixed glazing and framing areas when tested in accordance with ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. .

F. Water Penetration under Dynamic Pressure: Provide panel assemblies that do not evidence water leakage through fixed glazing and framing areas when tested in accordance with AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water that is controlled by flashing and gutters and drained to the exterior, or water that cannot damage adjacent materials or finishes.

G. Thermal Movements: Allow for thermal movements from ambient- and surface-temperature changes. Base calculations 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.

H. Energy Performance: Provide panel assemblies with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below and certified and labeled according to NFRC:

1. Thermal Transmittance (U-Factor): Fixed glazing and framing areas to have U-factor of not more than 0.08 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas to have a SHGC of no greater than 0.6 as determined in accordance with NFRC 200.
3. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. of fixed wall area as determined in accordance with ASTM E283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft..

2.2 FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

A. Fiberglass-Sandwich-Panel Assemblies: Translucent assemblies that are supported by aluminum framing and glazed with fiberglass-sandwich panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Kalwall Corporation 4", U-0.08 panels or comparable products by one of the following:
   a. Major Industries, Inc.

2.3 FIBERGLASS-SANDWICH PANELS

A. Fiberglass-Sandwich Panels: Uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core.

1. Core Insulation: Fill panel cores with fiberglass batt (U-Value equal 0.08).

B. Panel Thickness: 4 inches.

C. Grid Core: Mechanically interlocked, extruded-aluminum I-beams, with a minimum flange width of 7/16 inch.

1. Extruded Aluminum: ASTM B221, in alloy and temper recommended in writing by manufacturer.
2. I-Beam Construction: Thermally broken, extruded aluminum.
3. Grid Pattern: As indicated on Drawings.

D. Exterior Face Sheet:

1. Color: White .
2. Protective Weathering Surface: Manufacturer's standard.

E. Interior Face Sheet:

1. Color: White .

F. Fiberglass-Sandwich-Panel Adhesive: Manufacturer's standard for permanent adhesion of facings to cores.

G. Panel Strength:

1. Maximum Panel Deflection: 3-1/2 inches when a 4-by-12-foot panel is tested in accordance with ASTM E72 at 34 lbf/sq. ft., with a maximum 0.090-inch set deflection after five minutes.
2. Panel Support Strength: Capable of supporting, without failure, a 300-lbf concentrated load when applied to a 3-inch- diameter disk in accordance with ASTM E661.

H. Panel Performance:

1. Self-Ignition Temperature: 650 deg F or more in accordance with ASTM D1929.
2. Smoke-Developed Index: 450 or less in accordance with ASTM E84, or 75 or less in accordance with ASTM D2843.
3. Combustibility Classification: Class CC1 based on testing in accordance with ASTM D635.
4. Interior Finish Classification: Class A based on testing in accordance with ASTM E84.
5. Color Change: Not more than 3.0 units Delta E, when measured in accordance with ASTM D2244, after outdoor weathering compliant with procedures in ASTM D1435.

    a. Outdoor Weathering Conditions: Sixty months in southern Florida.

6. Impact Resistance: No fracture or tear at impact of 60 ft. x lbf by a 3-1/4-inch-diameter, 5-lb freefalling ball in accordance with UL 972 test procedure.
7. Haze Factor: Greater than 90 percent when tested in accordance with ASTM D1003.

2.4 ALUMINUM FRAMING SYSTEMS

A. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken, extruded aluminum.

B. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
4. Structural Profiles: ASTM B308/B308M.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.

D. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding fasteners and accessories; compatible with adjacent materials.

1. At closures, retaining caps, or battens, use ASTM A193/A193M, 300 series stainless steel screws.
2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.

E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M orASTM A153/A153Mrequirements.

F. Anchor Bolts: ASTM A307, Grade A, galvanized steel.

G. Concealed Flashing: Corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

H. Exposed Flashing and Closures: Aluminum sheet not less than 0.040 inch thick, finished to match framing.

I. Framing Gaskets: Manufacturer's standard.

J. Frame-System Sealants: As recommended in writing by manufacturer.

1. Sealant shall have a VOC content of 250 g/L or less.

K. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 FABRICATION

A. Frame System Fabrication:

1. Fabricate components that, when assembled, have the following characteristics:

a. Profiles that are sharp, straight, and free of defects or deformations.
b. Accurately fitted joints with ends coped or mitered.
c. Internal guttering systems or other means to drain water passing through joints, and moisture migrating within assembly to exterior.

2. Fabricate sill closures with weep holes and for installation as continuous component.
3. Reinforce components as required to receive fastener threads.

B. Panel Fabrication: Factory assemble and seal panels.

1. Laminate face sheets to grid core under a controlled process using heat and pressure to produce straight adhesive bonding lines that cover width of core members and that have sharp edges.

a. White spots indicating lack of bond at intersections of grid-core members are limited in number to four for every 40 sq. ft. of panel and limited in diameter to 3/64 inch.

2. Fabricate with grid pattern that is symmetrical about centerlines of each panel.
3. Fabricate panel to allow condensation within panel to escape.
4. Reinforce panel corners.

2.6 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two -coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions.

1. Do not install damaged components.
2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
3. Rigidly secure nonmovement joints.
4. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and immobilization of moving joints.
5. Seal joints watertight unless otherwise indicated.

B. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with corrosion-resistant coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.

C. Install components plumb and true in alignment with established lines and elevations.

D. Erection Tolerances: Install panel assemblies to comply with the following maximum tolerances:

1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet, but no greater than 1/2 inch over total length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Water-Spray Test: Before installation of interior finishes has begun, panel assemblies to be tested in accordance with AAMA 501.2 and to not show evidence of water penetration.

B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

END OF SECTION

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.

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. “Interior Aluminum Doors and Frames”
    c. "Aluminum-Framed Entrances and Storefronts"

6. Division 26 “Electrical” sections for connections to electrical power system and for low-voltage wiring.
7. 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
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:
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.

5. Key Schedule:

   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

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. Final keying schedule
e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. 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. Keying Conference

    a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
        1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
        2) Preliminary key system schematic diagram.
        3) Requirements for key control system.
        4) Requirements for access control.
        5) Address for delivery of keys.

2. 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.

3. 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
        2) Exit Devices
            a) Von Duprin: 3 years
        3) Closers
            a) LCN 4000 Series: 30 years

4) Automatic Operators
   a) LCN: 2 years

b. Electrical Warranty
   1) 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

   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. 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.

C. 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:

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:

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 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.
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: 17A.

2.07 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.
17. Special Options:

    a. Provide dogging indicators for visible indication of dogging status.
    b. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
        1) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
        2) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
        3) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper- infiltrated steel, with molybdenum disulfide low friction coating.
        4) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than $90^{\text{-degree}}$ engagement with strike to prevent door and frame separation under high static load.
        5) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
        6) Product Cycle Life: 1,000,000 cycles.
        7) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
        8) Latch release does not require separate trigger mechanism.
        9) Cable and latching system characteristics:

a) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
b) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
c) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
d) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
e) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.08 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.

2.09 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product:

    a. Best

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; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.10 KEYING

A. Scheduled System:

1. Existing factory registered system:

    a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:

    a. Replaceable Construction Cores.
        1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
            a) 3 construction control keys
            b) 12 construction change (day) keys.
        2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:

    a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
        1) Master Keying system or grand master keying locks as directed by the Owner. Cylinders and Cores provided by Contractor, final keying and combinating by Owner. Provide Cores and Cylinders compatible with Owners existing system.

    b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
    c. Provide keys with the following features:
        1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
        2) Patent Protection: Keys and blanks protected by one or more utility patent(s).

    d. Identification:
        1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
        2) Identification stamping provisions must be approved by the Architect and Owner.

3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

e. Quantity: Furnish in the following quantities.
1) Change (Day) Keys: 3 per cylinder/core.
2) Permanent Control Keys: 3.
3) Master Keys: 6.

2.11 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.

2.12 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.

2.13 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. Sizes 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.

2.14 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.

2.15 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.

2.16 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:

    a. LCN

2. Acceptable Manufacturers:

    a. Rixson
    b. ABH

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.17 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
2. Protection Plates: BHMA 630 (US32D)
3. Overhead Stops and Holders: BHMA 630 (US32D)
4. Door Closers: Powder Coat to Match
5. Weatherstripping: Clear Anodized Aluminum
6. Thresholds: Mill Finish Aluminum

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 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. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. 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.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. 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.

M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

N. 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.

O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

P. 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.

Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

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

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.

3.04 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.

3.05 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):
124C

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 NRP		652	IVE
1	EA	CLASSROOM SECURITY	LV9071L 17A		626	SCH
2	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7850 (COORDINATE VOLTAGE AS REQ'D)	✓	689	LCN
1	EA	GASKETING	488S		BK	ZER

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

THE WALL MAGNET SHALL BE WIRED TO THE FIRE ALARM PANEL THROUGH A SET OF NORMALLY-CLOSED, DRY CONTACTS (SUPPLIED BY THE FIRE ALARM CONTRACTOR).

MAGNETIC HOLD OPEN IS CONTINUOUSLY ENERGIZED ALLOWING THE DOOR TO BE HELD OPEN UNDER NORMAL BUILDING CONDITIONS. WHEN THE FIRE ALARM IS ACTIVATED, POWER TO THE MAGNETIC HOLD OPEN IS DISCONNECTED CAUSING THE DOOR CLOSER TO CLOSE THE DOOR. DOOR CAN ALSO BE MANUALLY RELEASED FROM THE MAGNET.

Hardware Group No. 02

For use on Door #(s):
127

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		628	IVE
1	EA	STOREROOM LOCK	LV9080L 17A		626	SCH
1	EA	MORTISE CYLINDER	1E74		626	BES
1	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
1	EA	OH STOP & HOLDER	100H		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	BLADE STOP SPACER	4040XP-61		689	LCN
1	EA	ARMOR PLATE	8400 36" X 2" LDW B-CS		630	IVE
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	655A		A	ZER
			WEATHERSTRIPPING BY DOOR/FRAME MFG.			

Hardware Group No. 03

For use on Door #(s):
124A 124B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	CDSI-98-DT		626	VON
1	EA	PANIC HARDWARE	CDSI-98-NL		626	VON
1	EA	RIM CYLINDER	1E72		626	BES
3	EA	MORTISE CYLINDER	1E74		626	BES
4	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61		689	LCN

Hardware Group No. 04

For use on Door #(s):
122 125

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	224XY		628	IVE
2	EA	PANIC HARDWARE	9849-L-17-LBL - AUXILIARY FIRE LATCH (AS REQ'D)		626	VON
2	EA	RIM CYLINDER	1E72		626	BES
2	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7850 (COORDINATE VOLTAGE AS REQ'D)		689	LCN
1	EA	GASKETING	488S		BK	ZER
1	EA	MEETING STILE	8217S		BK	ZER

NOTES:
1) RETURN ALL DEMO'D DOOR HARDWARE TO OWNER. DO NOT DISPOSE OF ANY DOOR HARDWARE.
2) LHR DOOR FOR DOOR 122 AND RHR DOOR FOR DOOR 125 TO SWING 180° TO WALL MOUNTED MAGNETIC HOLD-OPEN.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

THE WALL MAGNETS SHALL BE WIRED TO THE FIRE ALARM PANEL THROUGH A SET OF NORMALLY-CLOSED, DRY CONTACTS (SUPPLIED BY THE FIRE ALARM CONTRACTOR).

MAGNETIC HOLD OPENS ARE CONTINUOUSLY ENERGIZED ALLOWING THE DOORS TO BE HELD OPEN UNDER NORMAL BUILDING CONDITIONS. WHEN THE FIRE ALARM IS ACTIVATED, POWER TO THE MAGNETIC HOLD OPENS IS DISCONNECTED CAUSING THE DOOR CLOSERS TO CLOSE THE DOORS. DOORS CAN ALSO BE MANUALLY RELEASED FROM THE MAGNETS.

Hardware Group No. 05

For use on Door #(s):
123B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
2	EA	DUMMY PUSH BAR	350-DT-990		626	VON
2	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SURF. AUTO OPERATOR	4642	✓	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61		689	LCN
1	EA	RELAY/DOOR SEQUENCER	8310-845	✓		LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T	✓	630	LCN
1	EA	FLUSH MOUNT BOX	8310-867F			LCN
			WEATHERSTRIPPING BY DOOR/FRAME MFG.			

NOTES:
1) NO VESTIBULE SIDE ACTUATOR.

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

LOBBY ACTUATOR BUTTON IS ENABLED WHEN THE OPERATOR IS TURNED ON. PUSHING LOBBY ACTUATOR AT ANY TIME WILL IN SEQUENCE MOMENTARILY OPEN ONE DOOR AT THE INTERIOR VESTIBULE, MOMENTARILY RETRACT THE PANIC DEVICE LATCH FOR ONE DOOR AT THE EXTERIOR VESTIBULE, AND SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN THE ONE EXTERIOR VESTIBULE DOOR. FREE EGRESS AT ALL TIMES.

Hardware Group No. 06

For use on Door #(s):
126B

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
2	EA	DUMMY PUSH BAR	350-DT-990		626	VON
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61		689	LCN
			WEATHERSTRIPPING BY DOOR/FRAME MFG.			

OPERATIONAL DESCRIPTION: COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT, AND ALL RELATED TRADES.

BOTH ACTUATOR BUTTONS ARE ENABLED WHEN THE OPERATOR IS TURNED ON. PUSHING EITHER ENABLED ACTUATOR BUTTON WILL CAUSE THE AUTOMATIC OPERATOR TO MOMENTARILY OPEN THE DOOR. FREE EGRESS AT ALL TIMES.

Hardware Group No. 07

For use on Door #(s):
123A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		628	IVE
1	EA	CONT. HINGE	112XY EPT		628	IVE
1	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	FIRE RATED REMOVABLE MULLION	KR9954 STAB		689	VON
1	EA	FIRE EXIT HARDWARE	98-DT-F		626	VON
1	EA	ELEC FIRE EXIT HARDWARE	LX-QEL-98-NL-F-CON		626	VON
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
2	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	SURF. AUTO OPERATOR	4642		689	LCN
1	EA	BLADE STOP SPACER	4040XP-61		689	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	RELAY/DOOR SEQUENCER	8310-845			LCN
1	EA	ACTUATOR, WALL MOUNT	8310-853T		630	LCN
1	EA	FLUSH MOUNT BOX	8310-867F			LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192AA		AA	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-6W - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY			SCH
1	EA	CREDENTIAL READER	SUPPLIED BY ACCESS CONTROL PROVIDER			
1	EA	POWER SUPPLY	PS902 900-4RL-FA - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER FIRE RATED SEALS BY DOOR/FRAME MFG.			VON

NOTES:
1) VERIFY DOOR HARDWARE COMPATIBILITY WITH DOOR MANUFACTURER FIRE RATED ASSEMBLY PRIOR TO ORDER.
2) NO VESTIBULE SIDE ACTUATOR.

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 ONE DOOR AT THE EXTERIOR VESTIBULE AND ONE DOOR AT THE INTERIOR VESTIBULE IN SEQUENCE.

DEVICE IS ALSO CAPABLE OF BEING ELECTRONICALLY DOGGED DOWN FOR CERTAIN TIMES OF THE DAY VIA THE ACCESS CONTROL SYSTEM, THUS IN PUSH/PULL MODE. PUSHING EXTERIOR AUTO OPERATOR ACTUATOR AT THIS TIME WILL SIGNAL AUTO OPERATOR TO MOMENTARILY OPEN ONE DOOR AT THE EXTERIOR VESTIBULE AND ONE DOOR AT THE INTERIOR VESTIBULE IN SEQUENCE.

DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM. FREE EGRESS AT ALL TIMES.

Hardware Group No. 08

For use on Door #(s):
126A

Each to have:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		628	IVE
1	EA	CONT. HINGE	112XY EPT		628	IVE
1	EA	POWER TRANSFER	EPT10 CON		689	VON
1	EA	FIRE RATED REMOVABLE MULLION	KR9954 STAB		689	VON
1	EA	FIRE EXIT HARDWARE	98-DT-F		626	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-98-NL-F-CON		626	VON
1	EA	RIM CYLINDER	1E72		626	BES
1	EA	MORTISE CYLINDER	1E74		626	BES
2	EA	PERMANENT CORE	CONTRACTOR SUPPLIED - TO BE COMBINATED BY OWNER			BES
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61		689	LCN
1	EA	MULLION SEAL	8780N		BK	ZER
2	EA	DOOR SWEEP	8192AA		AA	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-6W - WIRE EXTENSION FROM POWER TRANSFER TO POWER SUPPLY			SCH
1	EA	CREDENTIAL READER	SUPPLIED BY ACCESS CONTROL PROVIDER			
1	EA	POWER SUPPLY	PS902 900-2RS-FA - COORDINATE POWER SUPPLY REQUIREMENTS W/SECURITY PROVIDER FIRE RATED SEALS BY DOOR/FRAME MFG.			VON

NOTES:
1) VERIFY DOOR HARDWARE COMPATIBILITY WITH DOOR MANUFACTURER FIRE RATED ASSEMBLY PRIOR TO ORDER.

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.

DEVICE IS ALSO CAPABLE OF BEING ELECTRONICALLY DOGGED DOWN FOR CERTAIN TIMES OF THE DAY VIA THE ACCESS CONTROL SYSTEM, THUS IN PUSH/PULL MODE.

DOORS TO REMAIN LOCKED WITH LOSS OF POWER OR ACTIVATION OF THE FIRE ALARM. FREE EGRESS AT ALL TIMES.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass for doors.
2. Glazing for aluminum framed storefronts.
3. Glazing sealants and accessories.

B. Related Requirements:

1. Section 088813 "Fire-Rated Glazing."

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.

C. IBC: International Building Code.

D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of the follo g products; 12 inches square.

1. Tinted glass.
2. Insulating glass.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved[and certified] by coated-glass manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.8 WARRANTY

A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to 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.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Gardner Glass, Inc.

2. Guardian Glass; SunGuard.
3. Oldcastle BuildingEnvelope.
4. Pilkington North America.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E1300.

1. Design Wind Pressures:

   a. As indicated on Drawings.

2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
4. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Aluminum with black, color anodic finish .

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant:

1. Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Dow Corning Corporation.
2) GE Construction Sealants; Momentive Performance Materials Inc.
3) Pecora Corporation.
4) Sika Corporation.
5) Tremco Incorporated.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks:

1. Type recommended by sealant or glass manufacturer.

D. Spacers:

1. Type recommended by sealant or glass manufacturer.

E. Edge Blocks:

1. Type recommended by sealant or glass manufacturer.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

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.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 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.

3.6 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 MONOLITHIC GLASS SCHEDULE

A. Glass Type:Clear annealed float glass.

1. Minimum Thickness: 6 mm.
2. Location: Interior locations where safety glazing is not indicated.

B. Glass Type: Fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Location: Interior locations where safety glazing is indicated.

3.8 INSULATING GLASS SCHEDULE

A. Glass Type:Low-E-coated, tinted insulating glass.

1. Basis-of-Design Product: Guardian Glass, SuperNeutral 68.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Tinted annealed float glass.
5. Tint Color: Gray as required to match existing facility glazing.
6. Interspace Content: Air.
7. Indoor Lite: Clear annealed float glass.
8. Low-E Coating: Sputtered on secondsurface.
9. Winter Nighttime U-Factor: 0.29 maximum.
10. Summer Daytime U-Factor: 0.28 maximum.
11. Visible Light Transmittance: 11 percent minimum.
12. Solar Heat Gain Coefficient: 0.25 maximum.
13. Location: Exterior storefront locations where safety glazing is not indicated.

B. Glass Type:Low-E-coated, tinted, fully tempered insulating glass.

1. Basis-of-Design Product: Guardian Glass, SuperNeutral 68.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Tinted annealed float glass.
5. Tint Color: Gray as required to match existing facility glazing.
6. Interspace Content: Air.
7. Indoor Lite: Clear annealed float glass.
8. Low-E Coating: Sputtered on second surface.
9. Winter Nighttime U-Factor: 0.29 maximum.
10. Summer Daytime U-Factor: 0.28 maximum.
11. Visible Light Transmittance: 11 percent minimum.
12. Solar Heat Gain Coefficient: 0.25 maximum.
13. Safety glazing required.
14. Location: Exterior locations where safety glazing is indicated

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior non-load-bearing wall studs.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Horizontal Deflection: For non-composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 10 lbf/sq. ft..

2.2 WALL FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 , hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Steel Studs and Tracks:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) ClarkDietrich Building Systems.
2) MBA Building Supplies.
3) MRI Steel Framing, LLC.
4) Phillips Manufacturing Co.
5) Steel Network, Inc. (The).

b. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection, 0.0269 inch minimum.
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide the following:

1. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: provide one of the following:

1) Blazeframe Industries; Bare Slotted Track (BST/BST 2).
2) CEMCO; California Expanded Metal Products Co.; CST Slotted Deflection Track.
3) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.
4) MBA Building Supplies; Slotted Deflecto Track.
5) Metal-Lite; The System.
6) Steel Network, Inc. (The); VertiTrack VTD.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Blazeframe Industries; Intumescent Framing, Fire Stop System.
b. CEMCO; California Expanded Metal Products Co.; FAS Track.
c. ClarkDietrich Building Systems; BlazeFrame.
d. Fire Trak Corp; Fire Trak System attached to studs with Fire Trak Posi Klip.
e. Metal-Lite; The System.
f. Perfect Wall, Inc.; .
g. Steel Network, Inc. (The); .

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.

2. Minimum Base-Steel Thickness: 0.0269 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch wide flanges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.

2. Depth: 1-1/2 inches.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Armstrong World Industries, Inc; Drywall Grid Systems.
b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
c. United States Gypsum Company; Wall-to-Wall Drywall Suspension System.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.

B. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Georgia-Pacific Building Products.
    c. National Gypsum Company.
    d. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. National Gypsum Company.
    c. USG Corporation.

2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

C. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum.
    b. National Gypsum Company.
    c. USG Corporation.

2. Core:

    a. Ceilings: 1/2 inch, regular type.
    b. Walls: 5/8 inch, Type X.

3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. L-Bead: L-shaped; exposed long flange receives joint compound.
    d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, 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 setting-type taping compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound-Attenuation Blankets: As specified in Section 072100 "Thermal Insulation."

D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch 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. 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. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. 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. Type X: Vertical surfaces unless otherwise indicated.
2. Ceiling Type: Ceiling surfaces.
3. Mold-Resistant Type:All surfaces in Toilet, Restrooms and Locker Rooms.

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-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On 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.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.

2. LC-Bead: Use at exposed panel edges.
3. U-Bead: Use at exposed panel edges.

3.5 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 for trim products specifically indicated as not intended to receive 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 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermoplastic-rubber base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.3 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.

1.4 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.

1.5 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 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 THERMOPLASTIC-RUBBER BASE (RB-1)

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on the Drawings or comparable products by one of the following:

1. Allstate Rubber Corp.
2. Armstrong World Industries, Inc.
3. Burke Mercer Flooring Products; a division of Burke Industries Inc.
4. Flexco.
5. Roppe Corporation, USA.
6. VPI Corporation.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location: As indicated on drawings for each type.

C. Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: As indicated by manufacturer's designations for each type.

1. Flexco.

2.2 VINYL MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
3. Johnsonite; A Tarkett Company.
4. Roppe Corporation, USA.

B. Profile and Dimensions: As required for flooring transition application.

C. Colors and Patterns: As selected from manufacturer's standard range.

2.3 INSTALLATION MATERIALS

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

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

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

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

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. 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 surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rubber sheet flooring.

B. Related Sections:

1. Section 096513 "Resilient Base and Accessories" for wall base and accessories installed with flooring.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation details and locations of the following:

1. Floor patterns.
2. Layout, colors, widths, and dimensions of game lines and markers.
3. Locations of floor inserts for athletic equipment installed through flooring.
4. Seam locations for sheet flooring.

C. Samples for Initial Selection: For each type of flooring indicated.

1. Game-Line and Marker Paint: Include charts showing available colors and glosses.

D. Samples for Verification: For each type, color, and pattern of flooring indicated, 6-inch-square Samples of same thickness and material indicated for the Work.

1. Game-Line and Marker-Paint Samples: Include Sample sets showing game-line- and marker-paint colors applied to flooring.
2. Seam Samples: For each vinyl sheet flooring color and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For flooring to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Sheet Vinyl Flooring Installer Qualifications: An experienced Installer who has completed sheet vinyl flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

1.5 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 storing.

B. Store materials to prevent deterioration. Store .

1.6 FIELD CONDITIONS

A. Adhesively Applied Products:

1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
3. Close spaces to traffic during flooring installation.
4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.

B. Install flooring after other finishing operations, including painting, have been completed.

1.7 COORDINATION

A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

PART 2 - PRODUCTS

2.1 SHEET VINYL FLOORING <Insert drawing designation>

A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Amarco Products.
2. Johnsonite; a Tarkett company.
3. Lonseal, Inc.
4. Robbins Sports Surfaces.
5. Sport Court; Subsidiary of Connor Sport Court International.

C. Description: Sheet vinyl flooring specifically designed for adhered athletic flooring applications.

D. Sheet Vinyl Flooring with Backing: ASTM F 1303.

1. Type (Binder Content): Type I, minimum binder content of 90 percent.
2. Wear-Layer Thickness: Grade 1.
3. Overall Thickness: 0.25-inch.
4. Interlayer Material: Foamed plastic.
5. Backing Class: Class C (foamed plastic).

E. Seaming Method: Heat welded.

F. Traffic-Surface Texture: Embossed.

G. Applied Finish: Factory-applied UV urethane.

H. Roll Size: Not less than 48 inches wide by longest length that is practical to minimize splicing during installation.

I. Color and Pattern: As indicated by manufacturer's designations.

2.2 ACCESSORIES

A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.

B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

C. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, 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.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of flooring.

B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
3. Moisture Testing:
   a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      1) Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
   b. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.

D. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

1. Do not install flooring until they are same temperature as space where they are to be installed.

E. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FLOORING INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions.

B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.

C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.

D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.4 SHEET FLOORING INSTALLATION

A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.

B. Lay out sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Locate seams per approved Shop Drawings.

C. Adhered Flooring: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

D. Vinyl Sheet Flooring Seams: Prepare and finish seams to produce surfaces flush with adjoining flooring surfaces.

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless flooring.

3.5 GAME LINES AND MARKERS

A. Mask flooring at game lines and markers, and apply paint to produce sharp edges. Where crossing, break minor game line at intersection; do not overlap lines.

B. Lay out game lines and markers to comply with rules and diagrams published by National Federation of State High School Associations for athletic activities indicated.

3.6 CLEANING AND PROTECTING

A. Do not cover flooring after finishing until finish reaches full cure.

B. Perform the following operations immediately after completing flooring installation:

1. Remove adhesive and other blemishes from flooring surfaces.
2. Sweep and vacuum flooring thoroughly.
3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.

C. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.

1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

SECTION 098436 - SOUND-ABSORBING CEILING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:

1. Sound-absorbing baffle panels.

B. Related Requirements:

1. Section 265119 "LED Interior Lighting" for coordinating light fixtures.

1.2 DEFINITIONS

A. NRC: Noise Reduction Coefficient.

B. SAA: Sound Absorption Average.

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 fabric facing, panel edge, core material, and mounting indicated.

B. Samples for Verification: For the following products:

1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain-removal instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Lighting: Do not install units until a lighting level of not less than 50 fc is provided on surfaces to receive the units.

C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.

D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Acoustical performance.
b. Fabric sagging, distorting, or releasing from panel edge.
c. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain ceiling units specified in this Section lit baffel sections with matching finishes from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. 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.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: [**450**] <**Insert value**> or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 SOUND-ABSORBING CEILING UNITS

A. Sound-Absorbing Baffle Panel (BAF-1): Manufacturer's standard panel construction consisting of facing material stretched over front and back faces and edge-framed core and bonded or attached to edges.

1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide the product indicated on the Drawings or comparable products by one of the following:

    a. Pre-approved equivalent..

2. Panel Shape: Flat.
3. Mounting: Top-edge mounted with manufacturer's standard suspension system , secured to substrate.
4. Core: Manufacturer's standard .
5. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
6. Edge Profile: Square .
7. Corner Detail in Elevation: Square with continuous edge profile indicated.
8. Facing Material: As indicated on Drawings.

2.4 MATERIALS

A. Sustainable Design Requirements:

1. Composite Wood Products: Products shall be made without urea formaldehyde.

B. Core Materials: Manufacturer's standard.

C. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations.

1. Fiber Content: 100 percent woven polyester.
2. Width: Custom width as indciated on Drawings..

D. Mounting Devices: Concealed on back or top edge of unit, recommended by manufacturer to support weight of unit.

2.5 FABRICATION

A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.

C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

1. Square Corners: Tailor corners.
2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent units.

D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

C. Align fabric pattern and grain with adjacent units.

3.3 INSTALLATION TOLERANCES

A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch in 48 inches , noncumulative.

B. Variation from Level or Slope: Plus or minus 1/16 inch .

C. Variation of Joint Width: Not more than 1/16 inch wide from hairline in 48 inches , noncumulative.

3.4 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Solvent-based finish coatings.
4. Dry fall coatings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inchesquare.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.3 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. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:

1. Product name and type (description).
2. Application and use instructions.
3. Surface preparation.
4. VOC Content.
5. Batch date
6. Color number.

B. 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 unless more stringent requirements are required by manufacturer's instructions.

1. Remove rags and waste from storage areas daily.

C. Handling: Maintain a clean, dry storage area to prevent contamination or damage to the coatings.

1.5 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. Basis-Of-Design Products: Subject to compliance with the requirements, provide the products indicated for each application by Sherwin-Williams Company or comparable products by one of the following:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Valspar Corporation (The).

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. 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.

B. 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: As indicated by manufacturer's designations on Drawing Material Index.

1. Note that specifications indicate systems to be used. Drawing material index is for color reference only.

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. Concrete: 12 percent.
2. Masonry (Clay and CMUs): 12 percent.
3. Gypsum Board: 12 percent.
4. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. 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 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. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. 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.

H. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

I. Existing Painted Substrates: Comply with the requirements of Specification Section 090190 "Maintenance of Painting and Coating" unless more stringent requirements are provided by the manufacturer.

J. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.3 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

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. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. 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.

D. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

a. Tanks that do not have factory-applied final finishes.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items exposed to view in final work.

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 paint for dry-film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint 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.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.

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.

3.6 INTERIOR PAINTING SCHEDULE

A. Wood Substrates:

1. Standard application unless noted otherwise; Eggshell Finish:

a. Prime Coat: PrepRite ProBlock Latex Primer/Sealer, B51 Series.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Pro Industrial Acrylic Eggshell, B66 Series.

B. CMU Substrates:

1. Standard applications unless noted otherwise; Eggshell Finish:

a. Block Filler: PrepRite Block Filler, B25W25.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: ProMar 200 Zero VOC Interior Latex, B20 Series.

C. Steel Substrates:

1. Door Frames and Miscellaneous Metals; Semi-Gloss Finish:

a. Prime Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series.

2. Vertical exposed structural steel; Eggshell Finish:

a. Prime Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Pro Industrial Acrylic Eggshell, B66-650 Series.

3. Water-Based Dry-Fall System; Flat (Exposed structure, standard areas):

a. Prime Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Pro Industrial Water Boarne Acrylic Dryfall, B42-80 Series.

D. Gypsum Board and Plaster Substrates:

1. New and Existing Gypsum Board and Plaster Walls; Eggshell Finish:

    a. Prime Coat: ProMar 200 Zero VOC Latex Primer, B28 Series.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: ProMar 200 Zero VOC Interior Latex, B20 Series.

2. Gyspum Board Ceilings and Soffits, Flat Finish:

    a. Prime Coat: ProMar 200 Zero VOC Latex Primer, B28 Series.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: SuperPaint Interior Latex with Sanitizing Technology, A87 Series.

E. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System, Flat Finish:

    a. Prime Coat: ProMar 200 Zero VOC Latex Primer, B28 Series.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: ProMar 400 Zero VOC Interior Latex, B30-4600 Series.

END OF SECTION

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
2. Show location of knockouts for hose valves.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 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 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

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.

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. Guardian Fire Equipment, Inc.
    c. JL Industries, Inc.; a division of the Activar Construction Products Group.
    d. Larsens Manufacturing Company.
    e. Nystrom, Inc.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Cold-rolled steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

E. Cabinet Trim Material: Steel sheet .

F. Door Material: Steel sheet.

G. Door Style: Center glass panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. 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.

J. 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. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated .

    a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

        1) Location: Applied to cabinet door.
        2) Application Process: Silk-screened .
        3) Lettering Color: Red.
        4) Orientation: Vertical.

K. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

    a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
    b. Color: White.

2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 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. Miter corners and grind smooth.
3. Provide factory-drilled mounting holes.
4. Prepare doors and frames to receive locks.
5. 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.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "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 unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for 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 or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Identification:

1. 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

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.3 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.4 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. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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 FM Global.

2.2 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, provide products by one of the following:

a. Babcock-Davis.
b. Guardian Fire Equipment, Inc.
c. JL Industries, Inc.; a division of the Activar Construction Products Group.
d. Larsens Manufacturing Company.
e. Nystrom, Inc.

2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
3. Valves: Nickel-plated, polished-brass body.
4. Handles and Levers: Stainless steel.
5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard[galvanized] steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. 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 in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: Top of fire extinguisher to be at 42 inches above finished floor.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

SECTION 116623 - GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basketball equipment.
2. Volleyball equipment.
3. Safety pads.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installation of floor-insert sleeves to be cast in concrete slabs and footings.
2. Section 096566 "Resilient Athletic Flooring" for game lines and markers.

1.2 DEFINITIONS

A. NFHS: National Federation of State High School Associations.

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 assembly, disassembly, and storage instructions for removable equipment.
2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Sustainable Design Submittals:

1. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.
2. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For gymnasium equipment.

1. Include plans, elevations, sections, and attachment details.

2. Include details of field assembly for removable equipment, connections, installation, mountings, floor inserts, and operational clearances.
3. Include diagrams for power, signal, and control wiring.

D. Samples: For each exposed product and for each item and color specified.

E. Samples for Verification: For the following products:

1. Pad Fabric: Wall padding minimum 3 inches square, with specified treatments applied. Mark face of material.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Court layout plans, reflected ceiling plans, and other details, drawn to scale, and coordinated with ceiling-suspended gymnasium equipment, floor inserts, game lines, and markers applied to finished flooring, and coordinated with each other, using input from installers of the items involved:

1. Structural members to which overhead-supported gymnasium equipment will be attached.
2. Suspended ceiling components, if any.

B. Setting Drawings: For embedded items and cutouts required in other work.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gymnasium equipment to include in operation and maintenance manuals.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium equipment.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Basketball backboard failures, including glass breakage.
b. Faulty operation of basketball backstops.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BASKETBALL EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AALCO Manufacturing.
2. ADP Lemco.
3. Basketball Products International.
4. Bison, Inc.
5. Douglas Industries, Inc.
6. Draper Inc.
7. Jaypro Sports, LLC.
8. Porter Athletic Equipment Company.
9. Spalding Equipment.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Standard Rules: Provide equipment according to the requirements of NFHS's "Basketball Rules Book."

D. Protruding fasteners or exposed bolt heads on front face of backboards are not permitted.

E. Connections: Manufacturer's standard connections or connections recommended in writing by manufacturer and complying with Section 055000 "Metal Fabrications" of size and type required to transfer loads to building structure.

F. Overhead-Supported Backstops:

1. Folding Type: Manufacturer's standard assembly for forward-folding backstop, with hardware and fittings to permit folding.
2. Framing: Steel pipe, tubing, and shapes designed to minimize vibration during play.

a. Center-Mast Frame: Welded with side sway bracing.
b. Finish: Manufacturer's standard polyester powder-coat finish.

3. Goal Height Adjuster: Adjustable from 8 to 10 feet to top of ring with gear-drive mechanism, locking in any position within adjustment range, with visible height scale attached to side of framing.

a. Operation:

1) Electrical: Electric operation with integral gear-drive motor, with limit switches preset to goal heights and the following:

a) Key switch control.

G. Backstop Safety Device: Designed to limit free fall if support cable, chains, pulleys, fittings, winch, or related components fail; with mechanical automatic reset; 6000-lb load capacity; one per folding backstop.

1. Retractor Device: Manufacturer's standard device designed to retract both support and safety cables, chains, and straps away from play of the basketball when backstop is in playing position; one per folding backstop.

H. Backstop Electric Operator: Provide operating machine of size and capacity recommended in writing by manufacturer for equipment specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components, Devices, and Accessories: Listed and labeled according to NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
3. Operator Mounting: On ceiling with equipment-mounting board.
4. Motor Electrical Characteristics:

    a. Horsepower: 1/2 hp.
    b. Voltage: 115 V ac, single phase, 60 hertz.

5. Remote-Control Station(s): NEMA ICS 6, Type 1 enclosure for recessed or flush mounting and momentary-contact, three-position, switch-operated control with up, down, and off functions.

    a. Group Key Switch Control Stations: One switch per each backstop.
    b. Keys: Provide one set of dual keys per station.
    c. Switches, Ganged: Single faceplate with multiple switch cutouts as indicated on Drawings.
    d. Control Station Enclosure: Provide prime-painted metal enclosure with key access, with two sets of keys per enclosure.

6. Limit Switches: Adjustable switches at each backstop, interlocked with motor controls and set to automatically stop backstop at fully retracted and fully lowered positions.

I. Basketball Backboards:

1. Shape and Size:

    a. Rectangular, 72 by 48 inches width by height[, with rounded corners].

2. Backboard Material: Provide with predrilled holes or preset inserts for mounting goals, and as follows:

a. Glass: Minimum 1/2-inch- thick, transparent tempered glass according to ASTM C1048 Kind FT (fully tempered) and with impact-testing requirements in 16 CFR 1201 Category II or ANSI Z97.1 Class A for safety glazing. Provide glass and framing system manufactured according to FIBA Level 1 or Level 2 requirement that glass does not split off if broken.

1) Frame: Provide glass with impact-absorbing resilient rubber or PVC gasket around perimeter in a fully welded, brushed-natural-finish, extruded-aluminum frame, with steel subframe, reinforcement, bracing, and mounting slots for mounting backboard frame to backstop.
2) Rim-Restraining Device: According to NCAA and NFHS rules and designed to ensure that basket remains attached if glass backboard breaks.

3. Target Area and Border Markings: Permanently etched in white color, marked in pattern and stripe width according to referenced standard rules.

J. Goal-Mounting Assembly: Compatible with goal, backboard, and backstop; with manufacturer's standard hole pattern for goal attachment.

1. Glass Backboard Goal-Mounting Assembly: Goal support framing and reinforcement designed to transmit load from goal to backstop and to minimize stresses on glass backboard.

K. Basketball Goals: Basket ring complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.

1. Single-Rim Basket Ring Competition Goal: Materials, dimensions, and fabrication complying with referenced standard rules.
2. Type:

a. Movable: Pressure-release design with manufacturer's standard breakaway mechanism and rebound characteristics identical to those of fixed, nonmovable ring.

3. Pressure-Release Characteristics: Positive-lock movable breakaway design, with manufacturer's standard mechanism, including preset pressure release, set to release at more than 100-lb load, and automatic reset. Provide movable ring with rebound characteristics identical to those of fixed, nonmovable ring.
4. Field Adjustment: Provide ring that is field adjustable for rebound elasticity without being removed from the backboard.
5. Mount: Rear.
6. Net Attachment: No-tie loops for attaching net to ring without tying.
7. Finish: Polyester powder-coat finish.

L. Basketball Nets: 12-loop-mesh net, between 15 and 18 inches long, sized to fit ring diameter, and as follows:

1. Cord: Made from white nylon.

M. Backboard Safety Pads: Designed for backboard thickness and extending continuously along bottom and up sides of backboard and over backstop as required by referenced standard rules.

1. Attachment: Peel-and-stick tape.
2. Color: Gray.

2.2 VOLLEYBALL EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AALCO Manufacturing.
2. ADP Lemco.
3. Bison, Inc.
4. Douglas Industries, Inc.
5. Draper Inc.
6. Jaypro Sports, LLC.
7. L. A. Steelcraft Products, Inc.
8. Porter Athletic Equipment Company.
9. Spalding Equipment.

B. Source Limitations: Obtain from single source from single manufacturer.

C. Standard Rules: Provide equipment according to the requirements of NFHS's "Volleyball Rules Book."

D. Floor Insert: Chrome-finished steel floor plate and steel pipe sleeve, concealed by floor plate, with capped bottom end, sized with ID to fit post standards, minimum 12 inches long, to securely anchor pipe sleeve below finished floor in concrete footing; with anchors designed for securing floor insert to floor substrate indicated; quantity as indicated on Drawings.

1. Flush Floor Plate: Manufacturer's standard hinged, lockable access cover, designed to be flush with adjacent flooring. Provide one tool(s) for unlocking access covers.

E. Post Standards: Removable, adjustable-height, telescoping, paired volleyball post standards, as indicated on Drawings, designed for easy removal from permanently placed floor inserts.

1. Materials: Extruded-aluminum pipe or tubing, with nonmarking plastic or rubber end cap or floor bumper to protect permanent flooring.
2. Nominal Pipe or Tubing Diameter: 3-inch OD at base.
3. Finish: Manufacturer's standard plated metal finish.
4. Net Height Adjuster: Track or rail system and lock mechanism, designed for infinite height adjustment, complete with fittings; designed for positioning net at heights indicated.

a. Net Heights: Between sitting volleyball net height and boys'/men's volleyball net height, 36 and 95-5/8 inches or more.

5. Height Markers: Clearly marked at regulation play heights for elementary school.

F. Net: 32 feet long; one per pair of paired post standards; and as follows:

1. Width and Polyester Mesh: 36 inches with 4-1/2-inch- square mesh made of black polyester string.

a. Hem Band Edges: White, 2-inch- wide top binding; black, 3/4-inch- wide bottom and side bindings; tie offs at top and bottom of each side end of net; and 1/4-inch- diameter rope, at least 42 feet long, threaded through top hem of binding.

2. Dowels: Minimum 1/2-inch- diameter fiberglass . Provide two dowels per net threaded through each side hem sleeve for straightening net side edges.

G. Net-Tensioning System: Designed to adjust and hold tension of net. Fully enclosed, nonslip, manufacturer's standard-type winch with cable length and fittings for connecting to net lines, positive-release mechanism, and manufacturer's standard handle. Mount net tensioner on post standard at side away from court. Provide end post with post top pulley. Provide opposing post with welded-steel loops, hooks, pins, or other devices for net attachment and post top grooved line guide.

H. Bottom Net Lock Tightener: Manufacturer's standard quick-release-type tension strap; a spring-loaded, self-locking tensioner; a turnbuckle; a pulley; or other device and linkage fittings designed to quickly and easily tighten bottom line or net.

I. Safety Pads: Consisting of minimum 1-1/4-inch- thick, multiple-impact-resistant polyurethane foam filler covered by puncture- and tear-resistant fabric cover, minimum 14-oz./sq. yd. PVC-coated polyester, treated with fungicide for mildew resistance; with fire-test-response characteristics indicated. Provide pads with hook-and-loop closure or attachments for the following components:

1. Post Standards: Wraparound style pads, designed to totally enclose each standard to a minimum height of 66 inches; one per post.
2. Fabric Cover Flame-Resistance Ratings: Complies with NFPA 701.
3. Fabric Color: As indicated by manufacturer's designations.

J. Post Standard Transporter: Manufacturer's standard wheeled unit designed for transporting a single post.

K. Wall Storage Rack: Manufacturer's standard unit designed for mounting on walls and for storing post standards in vertical position, with retaining arms, fittings for padlock, and mounting hardware; number of units as required to provide storage for specified equipment.

L. Storage Cart: Manufacturer's standard wheeled unit designed for transporting and storing volleyball equipment and passing through [36-inch-] <Insert dimension> wide door openings. Fabricate welded-steel tubing units with heavy-duty casters, including no fewer than two swivel casters. Fabricate wheels from materials that do not damage or mark floors; number of units as required to provide transport and storage for specified equipment.

2.3 SAFETY PADS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on the Drawings or comparable products by one of the following:

1. AALCO Manufacturing.
2. ADP Lemco.
3. American Athletic, Inc.
4. Bison, Inc.
5. Douglas Industries, Inc.
6. Draper Inc.
7. Jaypro Sports, LLC.
8. Porter Athletic Equipment Company.
9. Spalding Equipment.

B. Source Limitations: Obtain from single source from single manufacturer.

C. 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.

D. Pad Coverings: Provide safety pad fabric covering that is fabricated from puncture- and tear-resistant, PVC-coated polyester or nylon-reinforced PVC fabric, minimum 14-oz./sq. yd. and treated with fungicide for mildew resistance; with surface-burning characteristics indicated, and lined with fire-retardant liner.

E. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board, with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.

1. Backer Board: Minimum 3/8-inch- thick fire-retardant-treated plywood by pressure process according to AWPA U1, Use Category UCFA Fire Retardant Interior.
2. Fire-Resistive Fill: Multiple-impact-resistant foam minimum 1-1/2-inch- thick, fire-resistive neoprene, 6.0-lb/cu. ft. density.
3. Size: Each panel section 24 inches wide by minimum 72 inches long.
4. Number of Modular Panel Sections: As indicated on Drawings.
5. Installation Method: Concealed mounting Z-clips.
6. Fabric Covering Color(s): As indicated by manufacturer's designations for one color(s).

F. Corner Wall Safety Pads: Wall corner pad consisting of minimum 1-1/4-inch- thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with backer board and manufacturer's standard anchorage to wall.

1. Length: Each pad minimum 72 inches .
2. Fabric Covering Color(s): Match color of wall safety pads for one color(s).

G. Column Safety Pads: Pads covering exposed flange of columns to height indicated, consisting of minimum 1-1/4-inch- thick, multiple-impact-resistant, closed-cell, polyethylene-foam filler, covered on both sides and all edges by fabric covering with backer board and manufacturer's standard anchorage to column.

1. Length: Each pad minimum 72 inches .
2. Fabric Covering Color(s): Match color of wall safety pads for one color(s).

H. Cutout Trim: Manufacturer's standard flanged cutout trim kits for fitting pads around switches, receptacles, and other obstructions.

1. Color: Black.

2.4 MATERIALS

A. Support Cable: 1/4-inch- diameter, 7x19 galvanized-stranded-steel wire rope with a breaking strength of 7000 lb. Provide fittings according to the wire rope manufacturer's written instructions for size, number, and installation method.

B. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80 heat-treated alloy-steel chains, according to ASTM A391/A391M, with commercial-quality, hot-dip galvanized steel connectors and hangars.

C. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, according to ASTM A413/A413M (Grade 30 proof coil chain or higher grade recommended by gymnasium equipment manufacturer). Provide coating type, chain size, number, and installation method according to manufacturer's written instructions.

D. Castings and Hangers: Malleable iron, according to ASTM A47/A47M; grade as required for structural loading.

E. Composite Wood Products: Products shall be made without urea formaldehyde.

F. Anchors, Fasteners, Fittings, and Hardware: Gymnasium equipment manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.

G. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, according to ASTM C1107/C1107M, with minimum strength recommended in writing by gymnasium-equipment manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for court layout, alignment of mounting substrates, installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.

1. Verify critical dimensions.
2. Examine supporting structure, subgrades, and footings below finished floor.
3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions and competition rules for each type of gymnasium equipment.

B. Install gymnasium equipment after other finishing operations, including painting, have been completed unless otherwise indicated.

C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relationship to adjacent construction; and aligned with court layout.

1. Floor-Insert Elevation: Coordinate installed heights of floor inserts with installation and field finishing of finish flooring and floor-plate type.
2. Operating Gymnasium Equipment: Verify clearances for movable components of gymnasium equipment throughout entire range of operation and for access to operating components.

D. Floor-Insert Setting: Clean oversized, recessed voids in concrete substrate of debris. Position each sleeve, and fill void around sleeve with grout, mixed and placed according to grout manufacturer's written instructions. Protect portion of sleeve above subfloor and footing from splatter. Verify that sleeves are set plumb, aligned, and at correct height and spacing; hold in position during placement and finishing operations until grout is sufficiently cured. Set insert so top surface of completed unit is flush with finished flooring surface.

E. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure built-in and permanently placed gymnasium equipment to structural support and to properly transfer load to in-place construction.

F. Connections: Connect electric operators to building electrical system.

G. Removable Gymnasium-Equipment Components: Assemble in place to verify that equipment and components are complete and in proper working order. Disassemble removable gymnasium equipment after assembled configuration is approved by Architect, and store units in location indicated on Drawings.

3.3 INSTALLATION OF SAFETY PADS

A. Mount with bottom edge at dimension indicated on Drawings above finished floor.

B. Cutout Trim: Limit cuts in face of padding so that cuts are securely and fully concealed behind trim-kit flange.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Perform visual inspections and operational tests as recommended by referenced standard rules of each sport and the equipment manufacturer.
2. Test rebound elasticity of basketball goals.
3. Test basketball goal pressure-release characteristics and adjustability.

C. Gymnasium equipment will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly; free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

END OF SECTION

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hybrid-tile entrance mats.
2. Recessed frames.

1.2 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor mats and frames.

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 floor mats and frames.

B. Shop Drawings:

1. Items penetrating floor mats and frames, including door control devices.
2. Divisions between mat sections.
3. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Mat: Assembled sections of floor mat.
2. Frame Members: Sample of each type and color.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

1.5 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. Replacement tiles for recessed matts: Full-size tile units equal to 2 percent of amount installed, but no fewer than 10 units.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Wheel load of 600 lb per wheel.

B. Accessibility Standard: Comply with applicable provisions in ICC A117.1.

2.2 HYBRID-TILE ENTRANCE MATS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Pre-approved Equivelant.

B. Carpet-Resilient Hybrid Type Tiles: Nylon carpet bonded to flexible vinyl backing and open grid vinyl compound molded tiles with concealed interlocking joint tabs to form mats 3/8 or 7/16 inch thick with nonraveling edges forming solid tiles.

1. Colors, Textures, and Patterns: As indicated by manufacturer's designations.
2. Tile Size: 20 inches square..

2.3 FRAMES

A. Recessed Frames: Manufacturer's standard extrusion.

2.4 FABRICATION

A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.

1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed mat frames and mats to comply with manufacturer's written instructions so that tops of mats will be flush with adjoining finished flooring. Set mats with tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.

1. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
3. Delay setting mats until construction traffic has ended.

B. Install surface-type units to comply with manufacturer's written instructions; coordinate with entrance locations and traffic patterns.

1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

SECTION 260010 - SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. A: Ampere, unit of electrical current.
2. AC or ac: Alternating current.
3. AFCI: Arc-fault circuit interrupter.
4. AIC: Ampere interrupting capacity.
5. AL, Al, or ALUM: Aluminum.
6. ASD: Adjustable-speed drive.
7. ATS: Automatic transfer switch.
8. AWG: American wire gauge; see ASTM B258.
9. BAS: Building automation system.
10. BIL: Basic impulse insulation level.
11. BIM: Building information modeling.
12. CAD: Computer-aided design or drafting.
13. CB: Circuit breaker.
14. cd: Candela, the SI fundamental unit of luminous intensity.
15. CO/ALR: Copper-aluminum, revised.
16. CU or Cu: Copper.
17. CU-AL or AL-CU: Copper-aluminum.
18. dB: Decibel, a unitless logarithmic ratio of two electrical, acoustical, or optical power values.
19. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
20. dB(adjusted) or dBa: Decibel weighted absolute noise power with respect to 3.16 pW (minus 85 dBm).
21. dBm: Decibel absolute power with respect to 1 mW.
22. DC or dc: Direct current.
23. DDC: Direct digital control (HVAC).
24. EGC: Equipment grounding conductor.
25. ELV: Extra-low voltage.
26. EMF: Electromotive force.
27. EMI: Electromagnetic interference.
28. EPM: Electrical preventive maintenance.

29. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.
30. FLC: Full-load current.
31. ft: Foot.
32. ft-cd: Foot-candle, the antiquated U.S. Standard unit of illuminance, equal to one international candle measured at a distance of one foot, that was superseded in 1948 by the unit "footcandle" after the SI unit candela (cd) replaced the international candle; see "fc,"
33. GEC: Grounding electrode conductor.
34. GFCI: Ground-fault circuit interrupter.
35. GFPE: Ground-fault protection of equipment.
36. GND: Ground.
37. HACR: Heating, air conditioning, and refrigeration.
38. HDPE: High-density polyethylene.
39. HP or hp: Horsepower.
40. HVAC: Heating, ventilating, and air conditioning.
41. Hz: Hertz.
42. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
43. IP: Ingress protection rating (enclosures); Internet protocol (communications).
44. IR: Infrared.
45. IS: Intrinsically safe.
46. IT&R: Inspecting, testing, and repair.
47. ITE: Information technology equipment.
48. kAIC: Kiloampere interrupting capacity.
49. kcmil or MCM: One thousand circular mils.
50. kV: Kilovolt.
51. kVA: Kilovolt-ampere.
52. kVAr or kVAR: Kilovolt-ampere reactive.
53. kW: Kilowatt.
54. kWh: Kilowatt-hour.
55. LAN: Local area network.
56. lb: Pound (weight).
57. lbf: Pound (force).
58. LCD: Liquid-crystal display.
59. LED: Light-emitting diode.
60. Li-ion: Lithium-ion.
61. lm: Lumen, the SI derived unit of luminous flux.
62. LV: Low voltage.
63. lx: Lux, the SI derived unit of illuminance equal to one lumen per square meter.
64. m: Meter.
65. MLO: Main lugs only.
66. NC: Normally closed.
67. Ni-Cd: Nickel-cadmium.
68. Ni-MH: Nickel-metal hydride.
69. NO: Normally open.
70. NPT: National (American) standard pipe taper.
71. OCPD: Overcurrent protective device.
72. PF or pf: Power factor.

73. PLFA: Power-limited fire alarm.
74. PV: Photovoltaic.
75. PVC: Polyvinyl chloride.
76. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
77. RMS or rms: Root-mean-square.
78. RPM or rpm: Revolutions per minute.
79. SCR: Silicon-controlled rectifier.
80. SPD: Surge protective device.
81. sq.: Square.
82. SWD: Switching duty.
83. TR: Tamper resistant.
84. TVSS: Transient voltage surge suppressor.
85. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
86. UL CCN: UL Category Control Number.
87. UPS: Uninterruptible power supply.
88. USB: Universal serial bus.
89. UV: Ultraviolet.
90. V: Volt, unit of electromotive force.
91. V(ac): Volt, alternating current.
92. V(dc): Volt, direct current.
93. VA: Volt-ampere, unit of complex electrical power.
94. VAR: Volt-ampere reactive, unit of reactive electrical power.
95. VFC: Variable-frequency controller.
96. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
97. W: Watt, unit of real electrical power.
98. Wh: Watt-hour, unit of electrical energy usage.
99. WPTE: Wireless power transfer equipment.
100. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. EMT-S: Steel electrical metallic tubing.
3. ERMC: Electrical rigid metal conduit.
4. ERMC-S: Steel electrical rigid metal conduit.
5. ERMC-S-G: Galvanized-steel electrical rigid metal conduit.
6. FMC: Flexible metal conduit.
7. FMC-S: Steel flexible metal conduit.
8. FMT: Steel flexible metallic tubing.
9. FNMC: Flexible nonmetallic conduit. See "LFNC."
10. HDPE: HDPE underground conduit (thick wall).
11. HDPE-40: Schedule 40 HDPE underground conduit.
12. HDPE-80: Schedule 80 HDPE underground conduit.
13. IMC: Steel electrical intermediate metal conduit.
14. LFMC: Liquidtight flexible metal conduit.
15. LFMC-S: Steel liquidtight flexible metal conduit.
16. LFNC: Liquidtight flexible nonmetallic conduit.
17. LFNC-A: Layered (Type A) liquidtight flexible nonmetallic conduit.
18. PVC: Rigid PVC conduit.

19. PVC-40: Schedule 40 rigid PVC conduit.
20. RMC: See ERMC.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. CI: Circuit integrity cable.
2. CL2: Class 2 cable.
3. CL2P: Class 2 plenum cable.
4. CL2R: Class 2 riser cable.
5. CL2X: Class 2 cable, limited use.
6. CL3: Class 3 cable.
7. CL3P: Class 3 plenum cable.
8. CL3R: Class 3 riser cable.
9. CL3X: Class 3 cable, limited use.
10. FPL: Power-limited fire-alarm cable.
11. FPLP: Power-limited fire-alarm plenum cable.
12. FPLR: Power-limited fire-alarm riser cable.
13. MC: Metal-clad cable.
14. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
15. NPLF: Non-power-limited fire-alarm circuit cable.
16. NPLFP: Non-power-limited fire-alarm circuit cable for environmental air spaces.
17. NPLFR: Non-power-limited fire-alarm circuit riser cable.
18. THW: Thermoplastic, heat- and moisture-resistant cable.
19. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
20. THHW: Thermoplastic, heat- and moisture-resistant cable.
21. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.

D. Abbreviations and Acronyms for Electrical Flexible Cord Types:

1. SEO: 600 V extra-hard-usage, hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
2. SEOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer covering for damp locations.
3. SJEO: 300 V hard-usage, junior hard-service cord with thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
4. SJEOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic elastomer insulation and oil-resistant thermoplastic elastomer outer cover for damp locations.
5. SJO: 300 V hard-usage, junior hard-service cord with thermoset insulation and oil-resistant thermoset outer cover for damp locations.
6. SJOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer cover for damp locations.
7. SJTO: 300 V hard-usage, junior hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.

8. SJTOO: 300 V hard-usage, junior hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer cover for damp locations.
9. SO: 600 V extra-hard-usage, hard-service cord with thermoset insulation and oil-resistant thermoset outer covering for damp locations.
10. SOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoset insulation and oil-resistant thermoset outer covering for damp locations.
11. STO: 600 V extra-hard-usage, hard-service cord with thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.
12. STOO: 600 V extra-hard-usage, hard-service cord with oil-resistant thermoplastic insulation and oil-resistant thermoplastic outer covering for damp locations.

E. Definitions:

1. Basic Impulse Insulation Level (BIL): Reference insulation level expressed in impulse crest voltage with a standard wave not longer than 1.5 times 50 microseconds and 1.5 times 40 microseconds.
2. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
3. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.
4. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:

    a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
    b. Concrete Box: A box intended for use in poured concrete.
    c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
    d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
    e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
    f. Device Box: A box with provisions for mounting a wiring device directly to the box.
    g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.

h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
o. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
p. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
q. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
r. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
s. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.

5. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
6. Fault Limited: Providing or being served by a source of electrical power that is limited to not more than 100 W when tested in accordance with UL 62368-1.

a. The term "fault limited" is intended to encompass most Class 1, 2, and 3 power-limited sources complying with Article 725 of NFPA 70; Class ES1 and ES2 electrical energy sources that are Class PS1 electrical power sources (e.g., USB); and Class ES3 electrical energy sources that are Class PS1 and PS2 electrical power sources (e.g., PoE). See UL 62368-1 for discussion of classes of electrical energy sources and classes of electrical power sources.

7. Jacket: A continuous nonmetallic outer covering for conductors or cables.
8. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
9. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
10. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
11. Plenum: A compartment or chamber to which one or more air ducts are connected and that forms part of the air distribution system.
12. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
13. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
14. Sheath: A continuous metallic covering for conductors or cables.
15. UL Category Control Number (CCN): An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
16. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

    a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
    b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
    c. Extra-Low Voltage (ELV): Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
    d. Low Voltage (LV): Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.

17. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.3 COORDINATION

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:

1. NotifyLansing School District no fewer than seven days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Lansing School District's written permission.
3. Coordinate interruption with systems impacted by outage including, but not limited to, the following:

    a. Emergency lighting.
    b. Fire-alarm systems.

B. Arrange to provide temporary electrical power in accordance with requirements specified in Division 01.

1.4 SEQUENCING

A. Conduct and submit results of power system studies before submitting Product Data and Shop Drawings for electrical equipment.

1.5 FIELD CONDITIONS

A. Modeling, analysis, product selection, installation, and quality control for Work specified in Division 26 must comply with requirements specified in Section 260011 "Facility Performance Requirements for Electrical."

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Fire-alarm wire and cable.
3. Connectors and splices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

1. Alpha Wire; brand of Belden, Inc.
2. Belden Inc.
3. Service Wire Co.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

D. Conductor Insulation:

1. Type THHN and Type THWN-2. Comply with UL 83.
2. Type THW and Type THW-2. Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Circuits:

1. Single circuit with color-coded conductors.

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

E. Ground Conductor: Insulated.

F. Conductor Insulation:

1. Type TFN/THHN/THWN-2. Comply with UL 83.

G. Armor: Steel, interlocked.

2.3 FIRE-ALARM WIRE AND CABLE

A. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

1. Lead Content: Less than 300 parts per million.

B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.

2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with standard barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits:

1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

C. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION, GENERAL

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points in accordance with Section 260533.13 "Conduits for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

A. Comply with NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 270528.29 "Hangers and Supports for Communications Systems."

1. Install plenum cable in environmental airspaces, including plenum ceilings.
2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.

    a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.

3. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is[not] permitted.
4. Signaling Line Circuits: Power-limited fire-alarm cables [may] [must not] be installed in the same cable or pathway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.

D. Comply with requirements in Section 284621.11 "Addressable Fire-Alarm Systems"for connecting, terminating, and identifying wires and cables.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each of the following visual and electrical tests:

    a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    b. Test bolted connections for high resistance using one of the following:

        1) Thermographic survey.

    c. Inspect compression-applied connectors for correct cable match and indentation.
    d. Inspect for correct identification.
    e. Inspect cable jacket and condition.
    f. Continuity test on each conductor and cable.
    g. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values.

B. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding connectors.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product indicated.

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. General Characteristics: 600 V, THHN/THWN-2, copper wire or cable, green color, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

2.2 GROUNDING AND BONDING BUSHINGS

A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures, and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

2.3 GROUNDING AND BONDING CONNECTORS

A. Source Limitations: Obtain products from single manufacturer.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. Listing Criteria:

a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.

C. UL KDER - Crimped Lug Pressure-Type Grounding and Bonding Busbar Terminal :

1. General Characteristics: Cast silicon bronze, solderless compression-type wire terminals; with long barrel and two holes spaced on 5/8 or 1 inch centers for two-bolt connection to busbar.

D. UL KDER - Crimped Pressure-Type Grounding and Bonding Cable Connector :

1. General Characteristics: Crimp-and-compress connectors that bond to conductor when connector is compressed around conductor.

a. Copper, C and H shaped.

E. UL KDER - Split-Bolt Pressure-Type Grounding and Bonding Cable Connector :

1. General Characteristics: Bolts that surround cable and bond to cable under compression when nut is tightened.

a. Copper.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.

B. Inspect test results of grounding system measured at point of electrical service equipment connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

3.2 SELECTION OF GROUNDING AND BONDING CONDUCTORS

A. Conductors: Install solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.

B. Bonding Conductor: 4 AWG or 6 AWG, stranded conductor.

3.3 SELECTION OF CONNECTORS

A. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

3.4 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Special Techniques:

1. Conductors:

a. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

2. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
b. Make connections with clean, bare metal at points of contact.
c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1) Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
2) Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3) Use exothermic-welded connectors for outdoor locations; if disconnect-type connection is required, use bolted clamp.

3. Equipment Grounding:

a. Install insulated equipment grounding conductors with feeders and branch circuits.
b. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1) Feeders and branch circuits.
2) Lighting circuits.
3) Receptacle circuits.
4) Single-phase motor and appliance branch circuits.
5) Three-phase motor and appliance branch circuits.
6) Flexible raceway runs.
7) Armored and metal-clad cable runs.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with calibrated torque wrench in accordance with manufacturer's published instructions.

B. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.

2. Remove and replace defective components and retest.

C. Collect, assemble, and submit test and inspection reports.

1. Report measured ground resistances that exceed the following values:

a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ¦?.
b. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ¦?.

3.6 PROTECTION

A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.

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 Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

a. Flex-Strut Inc.
b. Gripple Inc.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel .
4. Channel Width: Selected for applicable load criteria .
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

a. Flex-Strut Inc.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    1) Hilti, Inc.
    2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
    3) Simpson Strong-Tie Co., Inc.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
5. Toggle Bolts: Stainless steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101
2. NECA NEIS 102.
3. NECA NEIS 105.
4. NECA NEIS 111.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways specified in Section 260533.13 "Conduits for Electrical Systems."

D. Comply with requirements for boxes specified in Section 260533.16 "Boxes and Covers for Electrical Systems."

E. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.

F. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

G. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2 inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA NEIS 1, EMT may be supported by openings through structure members, in accordance with NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

2. Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION

SECTION 260533.13 - CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Type EMT-S duct raceways and elbows.
2. Type ERMC-S duct raceways, elbows, couplings, and nipples.
3. Type FMC-S and Type FMC-A duct raceways.
4. Type LFMC duct raceways.
5. Fittings for conduit, tubing, and cable.

B. Products Installed, but Not Furnished, under This Section:

1. See Section 260553 "Identification for Electrical Systems" for electrical equipment labels.

C. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" for nonmetallic underground conduit with conductors (Type NUCC).

1.2 DEFINITIONS

A. Conduit: A structure containing one or more duct raceways.

B. Duct Raceway: A single enclosed raceway for conductors or cable.

C. Duct Bank: An arrangement of conduit providing one or more continuous duct raceways between two points.

PART 2 - PRODUCTS

2.1 TYPE EMT-S DUCT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN FJMX; including UL 797.

B. UL FJMX - Steel Electrical Metal Tubing (EMT-S) and Elbows:

1. Material: Steel.
2. Options:

a. Exterior Coating: Zinc.
b. Interior Coating: Zinc.
c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
d. Colors: As indicated on Drawings.

2.2 TYPE ERMC-S DUCT RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. UL DYIX - Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Exterior Coating: Zinc.
2. Options:

a. Interior Coating: Zinc.
b. Minimum Trade Size: Metric designator 21 (trade size 3/4).
c. Colors: As indicated on Drawings.

2.3 TYPE FMC-S DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN DXUZ; including UL 1.

B. UL DXUZ - Steel Flexible Metal Conduit (FMC-S):

1. Material: Steel.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.4 TYPE LFMC DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. UL DXHR - Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.

2.5 TYPE LFNC DUCT RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. UL DXOQ - Layered (Type A) Liquidtight Flexible Nonmetallic Conduit (LFNC-A):

1. Additional Criteria: Type A conduit with smooth seamless inner core and cover bonded together with one or more reinforcement layers between core and cover.
2. Options:

a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
b. Colors: As indicated on Drawings.
c. Markings: 90 deg C dry Sunlight resistant Outdoor.

2.6 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

C. UL DWTT - Fittings for Type ERMC Duct Raceways:

1. Listing Criteria: UL CCN DWTT; including UL 514B.
2. Options:

a. Material: Die cast.

b. Coupling Method: Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.

D. UL FKAV - Fittings for Type EMT Duct Raceways:

1. Listing Criteria: UL CCN FKAV; including UL 514B.
2. Options:

a. Material: Die cast.
b. Coupling Method: Setscrew coupling. Setscrew couplings with only single screw per conduit are unacceptable.

E. UL ILNR - Fittings for Type FMC Duct Raceways:

1. Listing Criteria: UL CCN ILNR; including UL 514B.

F. UL DXAS - Fittings for Type LFMC and Type LFNC Duct Raceways:

1. Listing Criteria: UL CCN DXAS; including UL 514B.

PART 3 - EXECUTION

3.1 SELECTION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of duct raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors:

1. Exposed: ERMC-S-G .
2. Exposed and installed on roof: ERMC-S-G.
3. Concealed Aboveground: , or RMC-S.

C. Indoors:

1. Exposed and Subject to Physical Damage: ERMC-S. Locations include the following:

a. Gymnasiums.
b. Provide from floor to 12-feet above finished floor.

2. Exposed and Not Subject to Physical Damage: EMT.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Damp or Wet Locations: ERMC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

D. Duct Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded-type fittings unless otherwise indicated.

3.2 INSTALLATION OF CONDUITS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Type EMT-S: Article 358 of NFPA 70 and NECA NEIS 101.
2. Type ERMC-S: Article 344 of NFPA 70 and NECA NEIS 101.
3. Type FMT: Article 360 of NFPA 70 and NECA NEIS 101.
4. Type LFMC: Article 350 of NFPA 70 and NECA NEIS 101.
5. Type LFNC: Article 342 of NFPA 70 and NECA NEIS 111.
6. Expansion Fittings: NEMA FB 2.40.
7. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. General Requirements for Installation of Duct Raceways:

a. Complete duct raceway installation before starting conductor installation.
b. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
c. Install no more than equivalent of three 90-degree bends in conduit run[except for control wiring conduits, for which no more than equivalent of two 90-degree fewer bends are permitted]. Support within 12 inch of changes in direction.
d. Make bends in duct raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
e. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
f. Support conduit within 12 inch of enclosures to which attached.
g. Install duct sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed duct raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install duct sealing fittings in accordance with NFPA 70.
h. Install devices to seal duct raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of duct raceways at the following points:

1) Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2) Conduit extending from interior to exterior of building.
3) Where otherwise required by NFPA 70.

i. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
j. Keep duct raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal duct raceway runs above water and steam piping.
k. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
l. Install pull wires in empty duct raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground duct raceways designated as spare above grade alongside duct raceways in use.
m. Install duct raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.

1) Termination fittings with shoulders do not require two locknuts.

n. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts.[Install insulated throat metal grounding bushings on service conduits].

2. Types FMC, LFMC, and LFNC:

a. Provide a maximum of 72 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

3. Stub-ups to Above Recessed Ceilings:

a. Provide EMT, IMC, or ERMC for duct raceways.
b. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

4. Identification: Provide labels for conduit assemblies, duct raceways, and associated electrical equipment.

a. Provide warning signs.

D. Interfaces with Other Work:

1. Coordinate installation of new products with existing conditions.
2. Coordinate with Section 078413 "Penetration Firestopping" for installation of firestopping at penetrations of fire-rated floor and wall assemblies.

3. Coordinate with Section 260529 "Hangers and Supports for Electrical Systems" for installation of conduit hangers and supports.

3.3 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 260533.16 - BOXES AND COVERS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metallic outlet boxes, device boxes, rings, and covers.
2. Junction boxes and pull boxes.
3. Cover plates for device boxes.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Cover plates for device boxes.
2. Hoods for outlet boxes.

B. Shop Drawings:

1. Shop drawings for floor boxes.

PART 2 - PRODUCTS

2.1 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
2. Listing Criteria: UL CCN QCIT; including UL 514A.

B. UL QCIT - Metallic Outlet Boxes and Covers:

1. Description: Box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.

2. Options:

a. Material: Sheet steel.
b. Sheet Metal Depth: Minimum 2.5 inch.

c. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing up to 50 lb.

C. UL QCIT - Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Options:

a. Material: Sheet steel.
b. Sheet Metal Depth: minimum 2.5 inch.

D. UL QCIT - Metallic Concrete Boxes and Covers:

1. Description: Box intended for use in poured concrete.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hubbell Premise Wiring; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
b. Wiremold; Legrand North America, LLC.

2.2 JUNCTION BOXES AND PULL BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN BGUZ; including UL 50 and UL 50E.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

2. Manufacturer's Published Instructions: Prepare and submit installation, testing, and operating instructions for product.

2.3 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria: UL CCN QCIT or UL CCN QCMZ; including UL 514D.
3. Wallplate-Securing Screws: Metal with head color to match wallplate finish.

B. UL QCIT or QCMZ - Metallic Cover Plates for Device Boxes:

1. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: 0.032 inch thick, Type 302/304 non-magnetic stainless steel with brushed finish .

C. UL QCIT or QCMZ - Nonmetallic Cover Plates for Device Boxes:

1. Options:

a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
b. Wallplate Material: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device.
c. Color: As indicated on architectural Drawings.

2.4 HOODS FOR OUTLET BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. Listing Criteria:

a. UL CCN QCIT or UL CCN QCMZ; including UL 514D.
b. Receptacle, Hood, Cover Plate, Gaskets, and Seals: UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

3. Mounts to box using fasteners different from wiring device.

B. Source Quality Control:

1. Product Data: Prepare and submit catalog cuts, brochures, and performance data illustrating size, physical appearance, and other characteristics of product.

C. UL QCIT or QCMZ - Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB, Electrification Business.
b. Allied Tube & Conduit; Atkore International.
c. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
d. Intermatic, Inc.
e. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

2. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
3. Options:

a. Provides gray, weatherproof, "while-in-use" cover.
b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 PREPARATION

A. Shop Drawings: Prepare and submit the following:

1. Shop Drawings for Floor Boxes: Show that floor boxes are located to avoid interferences and are structurally allowable. Indicate floor thickness at location where boxes are embedded in concrete floors and underfloor clearances where boxes are installed in raised floors.

3.2 SELECTION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 3R unless otherwise indicated.

2. Indoors:

a. Type 1 unless otherwise indicated.
b. Damp or Dusty Locations: Type 12.

C. Exposed Boxes Installed Less Than 2.5 m (8 ft) Above Floor:

1. Provide cast-metal boxes.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF BOXES AND COVERS FOR ELECTRICAL SYSTEMS

A. Comply with manufacturer's published instructions.

B. Reference Standards for Installation: Unless more stringent installation requirements are specified in Contract Documents or manufacturers' published instructions, comply with the following:

1. Outlet, Device, Pull, and Junction Boxes: Article 314 of NFPA 70.

2. Consult Architect for resolution of conflicting requirements.

C. Special Installation Techniques:

1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
2. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
3. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
4. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
5. Locate boxes so that cover or plate will not span different building finishes.
6. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
7. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
8. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
9. Set metal floor boxes level and flush with finished floor surface.
10. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
11. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:

    a. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
    b. Provide gaskets for wallplates and covers.

12. Identification: Provide labels for boxes and associated electrical equipment.

    a. Identify field-installed conductors, interconnecting wiring, and components.
    b. Provide warning signs.
    c. Label each box with engraved metal or laminated-plastic nameplate.

D. Interfaces with Other Work:

1. Coordinate installation of new products with existing conditions.

3.4 CLEANING

A. Remove construction dust and debris from boxes before installing wallplates, covers, and hoods.

3.5 PROTECTION

A. After installation, protect boxes from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Round sleeves.
2. Sleeve seal systems.
3. Foam sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

PART 2 - PRODUCTS

2.1 ROUND SLEEVES

A. Wall Sleeves, Steel:

1. Description: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.

B. Wall Sleeves, Cast Iron:

1. Description: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.

2.2 SLEEVE SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.

1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

2.3 FOAM SEALANTS

A. Description: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4 inch annular clear space between sleeve and raceway or cable, unless sleeve seal system is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inch above finished floor level. Install sleeves during erection of floors.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for wall assemblies.

C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

E. Underground, Exterior-Wall and Floor Penetrations:

1. Install cast-iron pipe sleeves with integral waterstops. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Install sleeve during construction of floor or wall.
2. Install steel pipe sleeves. Size sleeves to allow for 1 inch annular clear space between raceway or cable and sleeve for installing sleeve seal system. Grout sleeve into wall or floor opening.

3.2 INSTALLATION OF SLEEVE SEAL SYSTEMS

A. Install sleeve seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tags.
4. Signs.
5. Cable ties.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

1. Fire-protection and fire-alarm equipment must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Comply with NFPA 70E requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 1000 V or Less:

1. Black letters on orange field.
2. Legend: Indicate voltage.

B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded feeder and branch-circuit conductors.

1. Color must be factory applied[or field applied for sizes larger than 8 AWG if authorities having jurisdiction permit].
2. Colors for 208Y/120 V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Color for Neutral: White.
4. Color for Equipment Grounds: Green.

C. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

D. Warning labels and signs must include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."

E. Equipment Identification Labels:

1. Black letters on white field.

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

2.4 BANDS AND TUBES

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inch long, with diameters sized to suit diameters and that stay in place by gripping action.

2.5 TAGS

A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

2.6 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, [high-intensity reflective,]punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.

B. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

a. For signs up to 20 sq. inch, minimum 1/16 inch thick.
b. For signs larger than 20 sq. inch, 1/8 inch thick.
c. Engraved legend with black letters on white face.
d. Self-adhesive.
e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.7 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

J. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:

1. "POWER."

K. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

L. Snap-Around Labels: Secure tight to surface at location with high visibility and accessibility.

M. Self-Adhesive Labels:

1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inch high.

N. Snap-Around Color-Coding Bands: Secure tight to surface at location with high visibility and accessibility.

O. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inch high.

P. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.

Q. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

D. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

E. Arc Flash Warning Labeling: Self-adhesive labels.

F. Equipment Identification Labels:

1. Indoor Equipment: Baked-enamel signs Laminated acrylic or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign.
3. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Enclosed switches.
d. Battery-inverter units.

END OF SECTION

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Outdoor photoelectric switches, solid state, flexible mounting.
2. Indoor occupancy and vacancy sensors.
3. Conductors and cables.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Indoor occupancy and vacancy sensors.

1.3 WARRANTY

A. Special Extended Warranty: Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within extended warranty period.

1. Extended Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY AND VACANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper.
2. Hubbell Control Solutions; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. Lutron Electronics Co., Inc.
6. Philips; Signify North America; Signify Holding.
7. Sensor Switch, Inc.
8. WattStopper; Legrand North America, LLC.

B. General Requirements for Sensors:

1. Ceiling-mounted, solid-state indoor occupancy sensors.
2. Dual technology.
3. Separate power pack.
4. Hardwired connection to switch.
5. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
6. Operation:

    a. Combination Sensor: Unless otherwise indicated, sensor must be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

7. Power: Line voltage.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6 inch minimum movement of any portion of a human body that presents a target of not less than 36 sq. inch, and detect a person of average size and weight moving not less than 12 inch in either a horizontal or a vertical manner at an approximate speed of 12 inch/s.

2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Eaton.
2. Hubbell Control Solutions; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. Lutron Electronics Co., Inc.
6. Philips; Signify North America; Signify Holding.
7. Sensor Switch, Inc.
8. WattStopper; Legrand North America, LLC.

B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchboxusing hardwired connection.

1. Listed and labeled in accordance with NFPA 70, by a qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application[, and must comply with California Title 24].
2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

C. Wall-Switch Sensor:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft..
2. Sensing Technology: Dual technology - PIR and ultrasonic.
3. Switch Type: SP.
4. Voltage: 120 V.
5. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
6. Concealed, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes.
7. Color: White.
8. Faceplate: Color matched to switch.

2.3 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 22 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 16 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF SENSORS

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's instructions.

3.3 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring in accordance with Section 260553 "Identification for Electrical Systems.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Field tests must be witnessed by Tenant .

B. Tests and Inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.
2. Disconnecting and overcurrent protective devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

A. GFEP: Ground-fault equipment protection.

B. MCCB: Molded-case circuit breaker.

C. VPR: Voltage protection rating.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Lighting and appliance branch-circuit panelboards.
2. Disconnecting and overcurrent protective devices.
3. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
4. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.

6. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for series rating of installed devices.
7. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for SPD as installed in panelboard.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Furnish to Owner spare parts, for repairing panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.

B. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation in accordance with NEMA PB 1.

1.8 WARRANTY

A. Special Installer Extended Warranty: Installer warrants that fabricated and installed panelboards perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.

1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction, and marked for intended location and application.

B. Comply with NFPA 70.

C. Enclosures: Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

    a. Indoor Dry and Clean Locations: UL 50E, Type 1.

2. Height: 7 ft maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
5. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Same finish as panels and trim.

D. Incoming Mains:

1. Location: Convertible between top and bottom.
2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.

E. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

    a. Plating must run entire length of bus.
    b. Bus must be fully rated for entire length.

2. Interiors must be factory assembled into unit. Replacing switching and protective devices may not disturb adjacent units or require removing main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure.
5. Do not mount neutral bus in gutter.

F. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations must allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with lug on neutral bar for each pole in panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with lug on bar for each pole in panelboard.

G. Quality-Control Label: Panelboards or load centers must be labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers must have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

H. Future Devices: Panelboards or load centers must have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 5 percent.

I. Panelboard Short-Circuit Current Rating:

1. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for 100 percent interrupting capacity.

a. Panelboards and overcurrent protective devices rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. Listing Criteria: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Door-in-door construction with concealed hinges; secured with flush latch with tumbler lock; keyed alike. Outer door must permit full access to panel interior. Inner door must permit access to breaker operating handles and labeling, but current carrying terminals and bus must remain concealed.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB, Electrification Business.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

    a. Inverse time-current element for low-level overloads.
    b. Instantaneous magnetic trip element for short circuits.
    c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6 mA trip).
3. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.
    c. UL listed for reverse connection without restrictive line or load ratings.
    d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
    f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    g. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
    h. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
    i. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 A must have interchangeable rating plugs or electronic adjustable trip units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards in accordance with NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's published instructions.

B. Reference Standards:

1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NEMA PB 1.1.
2. Consult Architect for resolution of conflicting requirements.

C. Special Techniques:

1. Equipment Mounting:

    a. Attach panelboard to vertical finished or structural surface behind panelboard.
    b. Mount surface-mounted panelboards to steel slotted supports 5/8 inchin depth. Orient steel slotted supports vertically.

2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
3. Mount top of trim 7.5 ft above finished floor unless otherwise indicated.
4. Mount panelboard cabinet plumb and rigid without distortion of box.
5. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
6. Install overcurrent protective devices and controllers not already factory installed.

    a. Set field-adjustable, circuit-breaker trip ranges.

b. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver in accordance with manufacturer's published instructions.

7. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
8. Install filler plates in unused spaces.
9. Stub four 1 inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in future. Stub four 1 inch empty conduits into raised floor space or below slab not on grade.
10. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

D. Interfaces with Other Work:

1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each branch circuit device in power panelboards with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

E. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.

F. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.

G. Circuit Directory:

1. Provide directory card inside panelboard door, mounted in transparent card holder.

a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

3. Create directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
c. Instruments and Equipment:

1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Nonconforming Work:

1. Panelboards will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports, including certified report that identifies panelboards included and that describes scanning results, with comparisons of two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within panelboard, may not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature in accordance with manufacturer's published instructions.

END OF SECTION

SECTION 262726.11 - GENERAL-USE SWITCHES, DIMMER SWITCHES, AND FAN-SPEED CONTROLLER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General-use switches.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260923 "Lighting Control Devices" for occupancy sensors, timers, control-voltage switches, and control-voltage dimmers.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Toggle switches.
2. Key lock switches.

B. Samples:

1. One for each kind of toggle switch specified, in each finish and color specified.
2. One for each kind of key lock switch specified, in each finish and color specified.

PART 2 - PRODUCTS

2.1 GENERAL-USE SWITCHES

A. Toggle Switch :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

a. Device Color: White .
b. Configuration:

1) Extra-heavy-duty, 120-277 V, 20 A, single pole.

3. Accessories:

a. Cover Plate: 0.060 inch thick, stainless steel ; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

B. Toggle Switch with Forked Key Lock :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

a. Device Color: As indicated on architectural Drawings.
b. Configuration:

1) 120-277 V, 20 A, single pole.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Consult Architect for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform tests and inspections in accordance with manufacturers' instructions.

B. Nonconforming Work:

1. Unit will be considered defective if it does not pass tests and inspections.

3.3 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 262726.33 - GENERAL-GRADE DUPLEX STRAIGHT-BLADE RECEPTACLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Duplex straight-blade receptacles.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 262726.39 "Locking Receptacles" for twist-locking receptacles.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Duplex straight-blade receptacles.

PART 2 - PRODUCTS

2.1 DUPLEX STRAIGHT-BLADE RECEPTACLES

A. Description: General-grade duplex receptacles for use in wiring systems recognized by NFPA 70.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards:

1) UL CCN RTRT and UL 498.

C. Duplex Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour; Legrand North America, LLC.
    d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

    a. Device Color: White .
    b. Configuration:

        1) Heavy-duty, NEMA 5-20R.

3. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

D. Tamper-Resistant Duplex Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour; Legrand North America, LLC.
    d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

    a. Device Color: White .
    b. Configuration:

        1) General-duty, NEMA 5-20R.

3. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

E. Weather-Resistant, Isolated Ground Duplex Straight-Blade Receptacle :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Leviton Manufacturing Co., Inc.
    b. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

    a. Device Color: White .
    b. Configuration: Extra-heavy-duty, NEMA 5-20R.

3. Accessories:

    a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
    b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

3.2 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Architect for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black or white or red-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

D. Interfaces with Other Work:

1. Coordinate installation of new products with existing conditions.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.

B. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

3.4 ADJUSTING

A. Occupancy Adjustments for Controlled Receptacles: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 262726.37 - RECEPTACLES WITH ARC-FAULT AND GROUND-FAULT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles with GFCI devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Receptacles with GFCI devices.

1.3 WARRANTY

A. Special Manufacturer Extended Warranty: Manufacturer warrants that devices perform in accordance with specified requirements and agrees to provide repair or replacement of devices that fail to perform as specified within extended warranty period.

PART 2 - PRODUCTS

2.1 RECEPTACLES WITH GFCI DEVICES

A. Description: Receptacles containing GFCI device for use in accordance with NFPA 70.

B. Performance Criteria:

1. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2. General Characteristics:

a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.

C. General-Grade Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

a. Device Color: White .
b. Configuration: Heavy-duty, NEMA 5-20R.

3. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

D. General-Grade, Tamper-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour; Legrand North America, LLC.
d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

a. Device Color: White .
b. Configuration: Heavy-duty, [NEMA 5-15R] [NEMA 5-20R].

3. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

E. General-Grade, Weather-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour; Legrand North America, LLC.
   d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

   a. Device Color: White .
   b. Configuration: Heavy-duty, NEMA 5-20R.

3. Accessories:

   a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
   b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

F. General-Grade, Weather-Resistant, Tamper-Resistant Duplex Straight-Blade Receptacle with GFCI Device :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour; Legrand North America, LLC.
   d. Wiring Device-Kellems; Hubbell Incorporated, Commercial and Industrial.

2. Options:

   a. Device Color: White .
   b. Configuration: Heavy-duty, NEMA 5-20R.

3. Accessories:

   a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
   b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

3.2 INSTALLATION

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.
4. Consult Architect for resolution of conflicting requirements.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

    a. Mark cover or cover plate using hot, stamped, or engraved machine printing with black -filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.3 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
6. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.

B. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.

2. Remove and replace defective units and retest.

3.4 PROTECTION

A. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.

B. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION

SECTION 265119 - LED INTERIOR LIGHTING

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. Downlight.
2. Highbay, linear.
3. Strip light.
4. Suspended, linear.
5. Materials.

B. Related Requirements:

1. Section 260926 "Lighting Control Panelboards" for panelboards used for lighting control.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.

2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: 41 to 104 deg F.

1. Relative Humidity: Zero to 95 percent.

B. Altitude: Sea level to 1000 feet.

2.2 LUMINAIRE REQUIREMENTS

A. 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.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

2.3 DOWNLIGHT.

A. Manufacturers: Refer to Lumenaire Schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 1500r lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of 90. CCT of 3500 K.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. Universal mounting bracket.

E. Diffusers and Globes:

1. Fixed lens.
2. Wide light distribution.

2.4 HIGHBAY, LINEAR .

A. Manufacturers: Refer to Lumenaire Schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 8000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of 80. CCT of 4000 K.
4. Rated lamp life of 60,000 hours to L70.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

2.5 STRIP LIGHT .

A. Manufacturers: Refer to Lumenarie Schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 3000 lm.
2. CRI of 80. CCT of 3000 K.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. painted finish.
3. With integral mounting provisions.

2.6 SUSPENDED, LINEAR

A. Manufacturers: Refer to Lumenarie Schedule.

B. Nominal Operating Voltage: 120 V ac.

C. Lamp:

1. Minimum 200 lm/ft.
2. Minimum allowable efficacy of 85 lm/W.
3. CRI of 80. CCT of [2700 K] [3000 K] [4100 K] <Insert value>.

D. Housings:

1. Extruded-aluminum housing and heat sink.
2. Acoustic Material Wrap .
3. With integral mounting provisions.

2.7 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.

C. Stainless Steel:

1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209.

2.8 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

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 luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.

2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:

1. Attached to structural members in walls.

G. Suspended Luminaires: Refer to drawings.

1. Ceiling Mount:

a. Two 5/32-inch- diameter aircraft cable supports adjustable to 5-feet in length.
b. Four-point pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 5-feet in length.

2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

END OF SECTION

SECTION 265213 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Emergency lighting.
2. Exit signs.
3. Materials.
4. Luminaire support components.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

A. Correlated Color Temperature (CCT): The absolute temperature, measured in kelvins, of a blackbody whose chromaticity most nearly resembles that of the light source.

B. Color Rendering Index (CRI): Measure of the degree of color shift that objects undergo when illuminated by the light source as compared with the color of those same objects when illuminated by a reference source.

C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.

D. Lumen (lm): The SI derived unit of luminous flux equal to the luminous flux emitted within a unit solid angle by a unit point source (1 lm = 1 cd-sr).

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of emergency lighting unit, exit sign, and emergency lighting support.

a. Include data on features, accessories, and finishes.
b. Include physical description of unit and dimensions.
c. Battery and charger for light units.
d. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.5 WARRANTY

A. Special Installer Extended Warranty for Emergency and Exit Lighting: Installer warrants that fabricated and installed emergency luminaires and exit signs, including batteries, perform in accordance with specified requirements and agrees to repair or replace components and assemblies that fail to perform as specified within extended warranty period.

1. Extended Warranty Period: Two year(s) from date of Substantial Completion; full coverage for labor, materials, and equipment.

B. Special Manufacturer Extended Warranty for Batteries for Emergency and Exit Lighting: Manufacturer warrants that batteries for emergency luminaires and exit signs perform in accordance with specified requirements and agrees to provide repair or replacement of batteries that fail to perform as specified within extended warranty period.

1. Extended Warranty Period: Five year(s) from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 and UL 924, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

B. Comply with NFPA 101.

C. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with driver.

1. Emergency Connection: Provide wattage as shown on drawings to operate fixture at reduced power continuously upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

3. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.

    a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

D. External Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.

1. Housing: Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly must be located no less than half of distance recommended by [ballast] [emergency power unit] manufacturer, whichever is less.
2. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
3. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.2 EXIT SIGNS: Refer to drawings.

A. General Characteristics: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Sign :

1. Options:

    a. Operating at nominal voltage of 120 V(ac).
    b. Lamps for AC Operation:

        1) LEDs; 50,000 hours minimum rated lamp life.

    c. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components must be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Prismatic acrylic or Clear, UV-stabilized acrylic.

2. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded aluminum housing.
2. anodized powder coat finish.

E. Conduit: EMT, minimum metric designator 21 (trade size 3/4).

2.4 METAL FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Support Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 0.106 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

B. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position when testing emergency power unit.
3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
4. Luminaire-mounting devices must be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.

C. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inch, brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by authorities having jurisdiction.

B. Tests and Inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

C. Nonconforming Work:

1. Luminaire will be considered defective if it does not pass operation tests and inspections.
2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

3.5 SYSTEM STARTUP

A. Perform startup service:

1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.

3.6 ADJUSTING

A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:

1. Inspect luminaires. Replace , , batteries, exit signs, Inverters, and luminaires that are defective.

a. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

2. Conduct short-duration tests on all emergency lighting.

3.7 PROTECTION

A. Remove and replace luminaires and exit signs that are damaged or caused to be unfit for use by construction activities.

END OF SECTION

SECTION 284621.11 - ADDRESSABLE FIRE-ALARM 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. Existing fire-alarm system to be modified.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Duct smoke detectos
5. Fire-alarm notification appliances.

B. Related Requirements:

1. Section 260519 "Low-Voltage Electrical Power Conductors and Cables" or Section 260523 "Control Voltage Electrical Power Cables" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

A. DACT: Digital alarm communicator transmitter.

B. EMT: Electrical metallic tubing.

C. FACU: Fire-alarm control unit.

D. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the 2007 Energy Independence and Security Act (EISA).

E. NICET: National Institute for Certification in Engineering Technologies.

F. PC: Personal computer.

G. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:

1. Control Voltage: Listed and labeled for use in remote-control, signaling, and power-limited circuits supplied by a Class 2 or Class 3 power supply having rated output not greater than 150 V and 5 A, allowing use of alternate wiring methods complying with NFPA 70, Article 725.
2. Low Voltage: Listed and labeled for use in circuits supplied by a Class 1 or other power supply having rated output not greater than 1000 V, requiring use of wiring methods complying with NFPA 70, Article 300, Part I.

1.4 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. When new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from building.

B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.5 ACTION SUBMITTALS

A. Approved Permit Submittal: Submittals must be approved by authorities having jurisdiction prior to submitting them to Architect.

B. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

C. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in "Documentation" section of "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, and details, including details of attachments to other Work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include written statement from manufacturer that equipment and components have been tested as a system and comply with requirements in this Section and in NFPA 72.
9. Include performance parameters and installation details for each detector.

10. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For Installer.

B. Sample Warranty: Submittal must include line item pricing for replacement parts and labor.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following[and deliver copies to authorities having jurisdiction]:

   a. Comply with "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. Provide "Fire-Alarm and Emergency Communications System Record of Completion Documents" in accordance with "Completion Documents" Article in "Documentation" section of "Fundamentals" chapter in NFPA 72.
   c. Complete wiring diagrams showing connections between devices and equipment. Each conductor must be numbered at every junction point with indication of origination and termination points.
   d. Riser diagram.
   e. Device addresses.
   f. Record copy of site-specific software.
   g. Provide "Inspection and Testing Form" in accordance with "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

      1) Equipment tested.
      2) Frequency of testing of installed components.
      3) Frequency of inspection of installed components.
      4) Requirements and recommendations related to results of maintenance.
      5) Manufacturer's user training manuals.

   h. Manufacturer's required maintenance related to system warranty requirements.
   i. Abbreviated operating instructions for mounting at FACU and each annunciator unit.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Smoke Detectors, Fire Detectors[, and Flame Detectors]: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
3. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
4. Keys and Tools: One extra set for access to locked or tamperproofed components.
5. Audible and Visual Notification Appliances: One of each type installed.

1.9 QUALITY ASSURANCE

A. Installer Qualifications:

1. Personnel must be trained and certified by manufacturer for installation of units required for this Project.
2. Installation must be by personnel certified by NICET as fire-alarm Level II technician.
3. Obtain certification by NRTL in accordance with NFPA 72.
4. Licensed or certified by authorities having jurisdiction.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail because of defects in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EXISTING FIRE-ALARM SYSTEM TO BE MODIFIED

A. Basis for Pricing: National Time & Signal; 902 Series.

B. Description: Contractor shall provide new devices as shown and extend existing system wiring. Upgrade components as required in headend to support new devices. Provide new power supplies as required to support new devices. Coordinate power and wiring requirements with electrical contratcor during bidding.

C. Source Limitations for Fire-Alarm System and Components: Components must be compatible with, and operate as extension of, existing system. Provide system manufacturer's certification that components provided have been tested as, and will operate as, a system.

2.2 ADDRESSABLE FIRE-ALARM SYSTEM

A. Description:

1. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn-and-strobe notification for evacuation.

B. Performance Criteria:

1. Regulatory Requirements:

a. Fire-Alarm Components, Devices, and Accessories: Listed and labeled by a NRTL in accordance with NFPA 70 for use with selected fire-alarm system and marked for intended location and application.

2. General Characteristics:

a. Automatic sensitivity control of certain smoke detectors.
b. Fire-alarm signal initiation must be by one or more of the following devices[and systems]:

1) Manual stations.
2) Heat detectors.
3) Smoke detectors.
4) Duct smoke detectors.
5) Automatic sprinkler system water flow.

c. Fire-alarm signal must initiate the following actions:

1) Continuously operate alarm notification appliances.
2) Identify alarm and specific initiating device at FACU.
3) Transmit alarm signal to remote alarm receiving station.
4) Unlock electric door locks in designated egress paths.
5) Release fire and smoke doors held open by magnetic door holders.
6) Close smoke dampers in air ducts of designated air-conditioning duct systems.
7) Record events in system memory.
8) Indicate device in alarm on graphic annunciator.

d. Supervisory signal initiation must be by one or more of the following devices and actions:

1) Valve supervisory switch.
2) Zones or individual devices have been disabled.

3) FACU has lost communication with network.

e. System trouble signal initiation must be by one or more of the following devices and actions:

1) Open circuits, shorts, and grounds in designated circuits.
2) Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3) Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4) Loss of primary power at FACU.
5) Ground or single break in internal circuits of FACU.
6) Abnormal ac voltage at FACU.
7) Break in standby battery circuitry.
8) Failure of battery charging.
9) Abnormal position of switch at FACU or annunciator.

f. System Supervisory Signal Actions:

1) Initiate notification appliances.
2) Identify specific device initiating event at FACUand remote annunciators.
3) After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
4) Display system status on graphic annunciator.

g. Network Communications:

1) Provide network communications for fire-alarm system in accordance with fire-alarm manufacturer's written instructions.
2) Provide network communications pathway per manufacturer's written instructions and requirements in NFPA 72 and NFPA 70.

h. Device Guards:

1) Description: Welded wire mesh of size and shape for manual station, smoke detector, gong, or other device requiring protection.

a) Factory fabricated and furnished by device manufacturer.
b) Finish: Paint of color to match protected device.

i. Document Storage Box:

1) Description: Enclosure to accommodate standard 8-1/2-by-11 inch manuals and loose document records. Legend sheet will be permanently attached to door for system required documentation, key contacts, and system information. Provide two key ring holders with location to mount standard business cards for key contact personnel.
2) Material and Finish: 18-gauge cold-rolled steel; four mounting holes.

3) Color: Red powder-coat epoxy finish.
4) Labeling: Permanently screened with 1 inch high lettering "SYSTEM RECORD DOCUMENTS" with white indelible ink.
5) Security: Locked with 3/4 inch barrel lock. Provide solid 12 inch stainless steel piano hinge.

2.3 FIRE-ALARM CONTROL UNIT (FACU) - Existing National Time, 902 Series

A. Description: Field-programmable, microprocessor-based, modular, power-limited design with electronic modules.

B. Performance Criteria:

1. Regulatory Requirements: Comply with NFPA 72 and UL 864.
2. General Characteristics:

a. Addressable Initiation Device Circuits: FACU must indicate which communication zones have been silenced and must provide selective silencing of alarm notification appliance by building communication zone.

1) Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: FACU must be listed for releasing service.

b. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1) Pathway Class Designations: NFPA 72, Class B.
2) Pathway Survivability: Level 0.
3) Install no more than 50 addressable devices on each signaling-line circuit.
4) Install fault circuit isolators to comply with circuit performance requirements of NFPA 72 or with manufacturer's written instructions, whichever is more conservative.

c. Notification-Appliance Circuit:

1) Audible appliances must sound in three-pulse temporal pattern, as defined in NFPA 72.
2) Visual alarm appliances must flash in synchronization where multiple appliances are in same field of view, as defined in NFPA 72.

d. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls must be connected to fire-alarm system.

e. Remote Smoke-Detector Sensitivity Adjustment: Controls must select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out final adjusted values on system printer.
f. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of central-control microphone. Amplifiers must comply with UL 1711.

1) Allow application of, and evacuation signal to, indicated number of zones and simultaneously allow voice paging to other zones selectively or in combination.
2) Programmable tone and message sequence selection.
3) Standard digitally recorded messages for "Evacuation" and "All Clear."
4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of FACU.

g. Status Annunciator: Indicate status of various voice/alarm speaker zones and status of firefighters' two-way telephone communication zones.
h. Preamplifiers, amplifiers, and tone generators must automatically transfer to backup units, on primary equipment failure.
i. Primary Power: 24 V(dc) obtained from 120 V(ac) service and power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and DACT digital alarm radio transmitters must be powered by 24 V(dc) source.
j. Alarm current draw of entire fire-alarm system must not exceed 80 percent of power-supply module rating.
k. Secondary Power: 24 V(dc) supply system with batteries, automatic battery charger, and automatic transfer switch.
l. Batteries: Sealed lead calcium.

C. Accessories:

1. Instructions: Computer printout or typewritten instruction card mounted behind plastic or glass cover in stainless steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe functional operation of system under normal, alarm, and trouble conditions.

2.4 MANUAL FIRE-ALARM BOXES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. National Time.

B. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes must be finished in red with molded, raised-letter operating instructions in contrasting color; must show visible indication of operation; and must be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Double-action mechanism requiring two actions to initiate alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to FACU.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at top to permit lifting for access to initiate alarm. Lifting cover actuates integral battery-powered audible horn intended to discourage false-alarm operation.
4. Able to perform at up to 90 percent relative humidity at 90 deg F.
5. Material: Manual stations made of Lexan polycarbonate.
6. Able to be used in indoor areas.

2.5 SYSTEM SMOKE DETECTORS

A. Photoelectric Smoke Detectors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. National Time and Signal.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 268.

b. General Characteristics:

1) Detectors must be four -wire type.
2) Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
3) Base Mounting: Detector and associated electronic components must be mounted in twist-lock module that connects to fixed base. Provide terminals in fixed base for connection to building wiring.
4) Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5) Integral Visual-Indicating Light: LED type, indicating detector has operated[and power-on status].
6) Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
7) Operator at FACU, having designated access level, must be able to manually access the following for each detector:

a) Primary status.
b) Device type.
c) Present average value.
d) Present sensitivity selected.
e) Sensor range (normal, dirty, etc.).

8) Detector must have functional humidity range within 10 to 90 percent relative humidity.
9) Color: White.
10) Remote Control: Unless otherwise indicated, detectors must be digital-addressable type, individually monitored at FACU for calibration, sensitivity, and alarm condition[and individually adjustable for sensitivity by FACU].
11) Rate-of-rise temperature characteristic of combination smoke- and heat-detection units must be selectable at FACU for 15 or 20 deg F per minute.
12) Fixed-temperature sensing characteristic of combination smoke- and heat-detection units must be independent of rate-of-rise sensing and must be settable at FACU to operate at 135 or 155 deg F.
13) Multiple levels of detection sensitivity for each sensor.
14) Sensitivity levels based on time of day.

2.6 DUCT SMOKE DETECTORS

A. Coordinate this article with Drawings for power supply and FACU connections. Review two- and four-wire options in "General Requirements for System Smoke Detectors" Paragraph. Delete article and retain "Nonsystem Smoke Detectors" Article for two-wire, standalone operation where shutdown of fan is not required.Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. National Time and Signal

B. Description: Photoelectric-type, duct-mounted smoke detector.

C. Performance Criteria:

1. Regulatory Requirements:

a. NFPA 72.

UL 268 covers detectors that are part of a fire-alarm system and detectors intended solely for control of releasing devices such as door holders and dampers. Single- or multiple-station, nonsystem smoke-detector/alarm units for residential units are specified in "Nonsystem Smoke Detectors" Article. See Editing Instruction No. 8 in the Evaluations for discussion about detector locations.

b. UL 268A.

2. General Characteristics:

a. In first subparagraph below, retain first option for additions to existing four-wire systems or if detector auxiliary contacts are used for critical control functions such as air-handler shutdowns. Otherwise, retain type based on class of initiating-device circuit. Four-wire detectors have power supply wiring separate from the initiating-device circuit wiring. Both power supply wiring and initiating-device circuit wiring must be supervised.Detectors must be four -wire type.
b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to FACU.
c. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
d. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
e. Detector address must be accessible from FACU and must be able to identify detector's location within system and its sensitivity setting.
f. Operator at FACU, having designated access level, must be able to manually access the following for each detector:

1) Primary status.
2) Device type.
3) Present average value.
4) Present sensitivity selected.
5) Sensor range (normal, dirty, etc.).

g. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with supplied detector for smoke detection in HVAC system ducts.

Number of settable levels in FACU varies among manufacturers and between detector types. Indicate specific number of levels on Drawings or in "Remarks" column of a detector schedule.

h. Each sensor must have multiple levels of detection sensitivity.
i. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

Retain "Relay Fan Shutdown" Subparagraph below if required for direct shutdown of the fan associated with detector.

j. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 FIRE-ALARM ADDRESSABLE INTERFACE DEVICES

A. Retain "Manufacturers" Paragraph and list of manufacturers below to require products from manufacturers listed or a comparable product from other manufacturers.Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. National Time and Signal.

B. Performance Criteria:

1. Regulatory Requirements:

    a. NFPA 72.

2. General Characteristics:

    a. Include address-setting means on module.
    b. Store internal identifying code for control panel use to identify module type.
    c. Listed for controlling HVAC fan motor controllers.
    d. Monitor Module: Microelectronic module providing system address for alarm-initiating devices for wired applications with normally open contacts.

Retain "Integral Relay" Subparagraph below for elevator recall, shutdown duty, or other relay functions.

    e. Integral Relay: Capable of providing direct signal to elevator controller to initiate elevator recall.

        1) Allow control panel to switch relay contacts on command.
        2) Have minimum of two normally open and two normally closed contacts available for field wiring.

    f. Control Module:

        1) Operate notification devices.
        2) Operate solenoids for use in sprinkler service.

2.8 FIRE-ALARM NOTIFICATION APPLIANCES

A. Fire-Alarm Audible Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. National Time.

2. Description: Horns, bells, or other notification devices that cannot output voice messages.
3. Performance Criteria:

    a. Regulatory Requirements:

        1) NFPA 72.

    b. General Characteristics:

        1) Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

2) Horns: Electric-vibrating-polarized type, 24 V(dc); with provision for housing operating mechanism behind grille. Comply with UL 464. Horns must produce sound-pressure level of 90 dB(A-weighted), measured 10 ft. from horn, using coded signal prescribed in UL 464 test protocol.
3) Combination Devices: Factory-integrated audible and visible devices in single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Fire-Alarm Visible Notification Appliances:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. National Time & Signal.

2. Performance Criteria:

a. Regulatory Requirements:

1) NFPA 72.
2) UL 1971.

b. General Characteristics:

1) Rated Light Output:

a) 15/30/75/110 cd, selectable in field.

2) Clear or nominal white polycarbonate lens mounted on aluminum faceplate.
3) Mounting: Wall mounted unless otherwise indicated.
4) For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
5) Flashing must be in temporal pattern, synchronized with other units.
6) Strobe Leads: Factory connected to screw terminals.
7) Mounting Faceplate: Factory finished, red.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Preinstallation Testing: Perform verification of functionality of installed components of existing system prior to starting work. Document equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service in accordance with requirements indicated:

1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.

C. Protection of In-Place Conditions: Protect devices during construction unless devices are placed in service to protect facility during construction.

3.3 INSTALLATION OF EQUIPMENT

A. Comply with NECA 305, NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before other trades have completed cleanup must be replaced.
2. Devices installed, but not yet placed, in service must be protected from construction dust, debris, dirt, moisture, and damage in accordance with manufacturer's written storage instructions.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of building.
2. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to new points. New components must be capable of merging with existing configuration without degrading performance of either system.

C. Install wall-mounted equipment, with tops of cabinets not more than 78 inch above finished floor.

D. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in normal path of egress within 60 inch of exit doorway.
2. Mount manual fire-alarm box on background of contrasting color.
3. Operable part of manual fire-alarm box must be between 42 and 48 inch above floor level. Devices must be mounted at same height unless otherwise indicated.

E. Smoke- and Heat-Detector Spacing:

1. Comply with "Smoke-Sensing Fire Detectors" section in "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Smooth ceiling spacing must not exceed 30 ft..
3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas must be determined in accordance with Annex A [or Annex B]in NFPA 72.
4. HVAC: Locate detectors not closer than 60 inch from air-supply diffuser or return-air opening.
5. Lighting Fixtures: Locate detectors not closer than 12 inch from lighting fixture and not directly above pendant mounted or indirect lighting.

F. Install cover on each smoke detector that is not placed in service during construction. Cover must remain in place except during system testing. Remove cover prior to system turnover.

G. Audible Alarm-Indicating Devices: Install not less than 6 inch below ceiling. Install bells and horns on flush-mounted back boxes with device-operating mechanism concealed behind grille. Install devices at same height unless otherwise indicated.

H. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inch below ceiling. Install devices at same height unless otherwise indicated.

3.4 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate must be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

2. Nameplate must be laminated acrylic or melamine plastic signs with black background and engraved white letters at least 1/2 inch high.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

3.6 PATHWAYS

A. Pathways above recessed ceilings and in inaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inch above floor must be installed in EMT.

B. Pathways must be installed in EMT.

C. Exposed EMT must be painted red enamel.

3.7 CONNECTIONS

A. Make addressable connections with supervised interface device to the following devices and systems. Install interface device less than 36 inch from device controlled. Make addressable confirmation connection when such feedback is available at device or system being controlled.

3.8 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 270553 "Identification for Communications Systems."

3.9 GROUNDING

A. Ground shielded cables at control panel location only. Insulate shield at device location.

3.10 FIELD QUALITY CONTROL

A. Field tests must be witnessed by authorities having jurisdiction.

B. Administrant for Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
2. Administer and perform tests and inspections with assistance of factory-authorized service representative.

C. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection must be based on completed record Drawings and system documentation that is required by "Completion Documents, Preparation" table in "Documentation" section of "Fundamentals" chapter in NFPA 72.
    b. Comply with "Visual Inspection Frequencies" table in "Inspection" section of "Inspection, Testing and Maintenance" chapter in NFPA 72; retain "Initial/Reacceptance" column and list only installed components.

2. System Testing: Comply with "Test Methods" table in "Testing" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for public operating mode in accordance with manufacturer's written instructions. Perform test using portable sound-level meter complying with Type 2 requirements in ASA S1.4 Part 1/IEC 61672-1.
4. Test audible appliances for private operating mode in accordance with manufacturer's written instructions.
5. Test visible appliances for public operating mode in accordance with manufacturer's written instructions.
6. Factory-authorized service representative must prepare "Fire Alarm System Record of Completion" in "Documentation" section of "Fundamentals" chapter in NFPA 72 and "Inspection and Testing Form" in "Records" section of "Inspection, Testing and Maintenance" chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.11 MAINTENANCE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service must include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies must be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections in accordance with "Visual Inspection Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in "Test Methods" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per "Testing Frequencies" table in "Testing" paragraph of "Inspection, Testing and Maintenance" chapter in NFPA 72.

END OF SECTION

SECTION 281000 – TECHNOLOGY OVERVIEW

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section provides a project overview and general project and Contractor requirements for technology work.

B. The “Contractor” as referred to in these specifications, shall be the bidder whose bid is eventually chosen as the winner.

C. The “Engineer” as referred to in these specifications, shall be Commtech Design and its representative on this project.

D. The “Owner” as referred to in these specifications, shall be Lansing Public Schools and its representatives.

E. In the detailed specifications and on the contract drawings, the phrases “or equivalent,” “approved equivalent,” “approved equal,” “or equal” and “engineer approved equivalent” shall be used interchangeably and shall mean the same thing.

F. All equals, equivalents, or alternates shall be approved by the Engineer prior to ordering or installation. Without approval, deviation from the products listed in the specifications and on the drawings, shall be presumed to be nonconforming and shall be removed and replaced at the direction of the Engineer and at the Contractor’s expense.

1.02 DESCRIPTION OF PROJECT

A. Cabling and communications infrastructure.

1. The communications portion of the project encompasses communications cabling and termination equipment. The work shall include but not be limited to:
    a. Communications room racks and cabinets.
    b. Communications Cabling and Termination Equipment:
    a. User UTP Plenum rated CAT-6 cabling
2. All cables shall be labeled according to the drawings and the specifications.
3. All cables shall be terminated and tested as per the specifications.
4. Contractor shall provide personnel and equipment for full training and commissioning of the system.
2. All cables shall be supported by J-hooks or cable tray/ladder.
3. Label all cables
4. Test all cables.
5. The extent of the work shall be as shown on the drawing and detailed in these specifications

B. Audio and Video Systems

1. The audio and video systems in the building shall consist of but not be limited to:
    a. Cafeteria audio system
    b. Extension of existing paging system
2. Test all AV systems
3. The extent of the work shall be as shown on the drawing and detailed in these specifications

C. Access Control System
   1. Install an access control system to the new locations noted.
      a. Provide and install all equipment and software required. Server is existing in the district.
   2. Expand the existing Continental Access system that is in use at the building.
   3. Install all cabling required connect each door to the security panels
      a. Security panels shall be located in the communications room. See drawings.
      b. Wire from each power supply to the panels and to the devices at the doors
   4. Configure the system as per the owner's requirements. Meet with them to determine configuration parameters
   5. The extent of the work shall be as shown on the drawing and detailed in these specifications

D. Video Security System
   1. See drawings and specs for CAT-6 cable installation and who is responsible for installing cabling.
   2. Provide and install all cameras at all locations noted
   3. Install new cameras where noted.
   4. The existing VMS is Milestone.
   5. Servers are at the Lansing Schools Data center. They are existing.
   6. No servers shall be added as part of this work
   7. Fully configure all software and hardware required for recording of camera images
   8. Install viewing software on owner's computers and devices.
   9. The extent of the work shall be as shown on the drawing and detailed in these specifications

E. Paging Systems
   1. Expand the existing paging system to support the new area.
   2. Paging system shall be a combined Paging and Bell system that shall support the entire building or buildings as noted
   3. Work shall include but not be limited to:
      a. Paging speakers and amplifier fed off the existing system.
      b. Interfaces of the paging system to other systems noted
      c. Software on user PC's
      d. System Configuration,
   4. All cables shall be terminated and tested as per the specifications.
      a. All cables shall be supported by J-hooks in the ceiling.
      b. Label all cables
      c. Test all cables.
   5. Contractor shall provide personnel and equipment for full training and commissioning of the system.
   6. The extent of the work shall be as shown on the drawing and detailed in these specifications.

F. Clock System
   1. The master clock system shall be installed throughout the buildings as shown on the floorplans.
   2. Work shall include but not be limited to:
      a. Clocks
      b. Master Clock headend system and antennas
      c. Clock power supplies and wiring (plenum rated)

d. Clock cabling
   A) Label all cables
   B) Test all cables.
e. Raceways for the surface mounted clocks

3. All cables shall be terminated and tested as per the specifications.
   a. All cables shall be supported by J-hooks in the ceiling.
   b. Label all cables
   c. Test all cables.
4. Contractor shall provide personnel and equipment for full training and commissioning of the system.
5. The extent of the work shall be as shown on the drawing and detailed in these specifications.

G. Post installation documentation
   1. Each contractor shall provide post installation documentation as per the specifications. Shall include but not be limited to:
      a. Red-lined as-built drawings
      b. As-built detailed connectivity of AV and Network Systems
      c. As-built cable locations and cable labels at each location.
      d. Mark all splice locations
      e. Update of all access control locations and equipment at each door
      f. Camera locations and camera numbers.
      g. Spreadsheet (hard copy and Excel file) for all network, Wireless, telephones and cameras detailing:
         A) Mfg. Part number
         B) IP Address
         C) MAC Address
         D) Device number (Camera #, Telephone # etc)

1.03 STORAGE OF MATERIALS
A. All materials shall be secured when not in use by the Contractor.
B. It shall be the Contractor's responsibility to secure all equipment including all material to be installed as part of the contract. No changes shall be made to the contract due to loss or theft of equipment and materials not officially accepted by the Owner.

1.04 PERMITS
A. The State of Michigan requires that the Contractor apply for and obtain permits for data telecommunication installation.
B. This is required under State of Michigan Public Act 230. The inspector at the State of Michigan states that the code never exempted data telecommunications from permits and previous rules had overstepped their bounds. Only exemptions to the permit requirements are found in Public Act 230 MCL125.1528a.
   1. There is not a license required to apply for a permit per Public Act 407 MCL339.5737(3)(o).
C. The Permit is required under Public Act 230. The permit is under 2017 Michigan Electrical Code rules Part 8.
D. People who can obtain the permit include the Owner of the building or a company representing the owner. See Public Act 230 MCL125.1510.
   1. Contractor shall be required to apply for and obtain the permit
   2. Contractor shall be required to install the data telecommunications system to fully meet all code requirements and requirements of the Inspector and Authority Having Jurisdiction (AHJ)

E. State inspector has noted that the inspection process for data telecommunications is the same as any other inspection.
   1. Do not cover or conceal any wiring without approval.
   2. Electrical Inspectors will be conducting the inspections.
   3. Contractor shall be responsible for scheduling the inspections and attending the inspections with the inspector
F. State inspector has noted that the inspectors will be inspecting for code compliance including manufacture's installation instructions for the cables and terminations.
G. An installation may not pass inspection if there is any Non-compliance with the code.

1.05 REFERENCE SPECIFICATIONS-CABLING
A. All work applicable shall conform to the following standards:
B. ANSI/TIA-568-C.0, "*Generic Telecommunications* Cabling *for Customer Premises*",
C. ANSI/TIA-568-C.1, "*Commercial Building Telecommunications Cabling Standard*",
D. ANSI/TIA-568-C.2, "*Balanced Twisted-Pair Telecommunication Cabling and Components Standard*", ANSI/TIA-568-C.3, "*Optical Fiber Cabling Components Standard*",
E. ANSI/TIA-568-C.4, "*Broadband Coaxial Cabling and Components Standard*",
F. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
G. IA-606-B: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings including all Updates and Addenda.
H. TIA-607-C: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
I. EIA-472 General Specification for Fiber Optic Cable
J. EIA-472A Sectional Specification for Fiber Optic Communication Cables for Outside Aerial
K. EIA-472B Sectional Specification for Fiber Optic Communication Cables for Underground and Buried Use
L. EIA-472C Sectional Specification for Fiber Optic Communication Cables for Indoor Use
M. EIA-472D Sectional Specification for Fiber Optic Communication Cables for Outside Telephone Plant Use
N. NEC, 2015, or latest edition available
O. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
P. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
Q. IEEE 802.3bt-2018 - IEEE Standard for Ethernet Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs

1.06 CONTRACTOR-ALL
A. Each contractor shall be responsible for inspecting their own work and ensuring it meets the project requirements.
B. Contractor shall have a project manager who will be responsible for all work, workers, equipment, cabling and project management for their work. The project manager shall have the authority to make decisions for the contractor and schedule all workers.
C. Contractor shall attend all project meetings throughout the project.

D. All work on the project shall meet all applicable state, federal, local and industry codes and be installed according to the requirements of he Authority Having Jurisdiction (AHJ).

1.07 CONTRACTOR -CABLING

A. The Contractor shall show proof of an existing contractual relationship with the approved equipment manufacturer of the horizontal cabling system, and shall pass through the manufacturer's certification and warranty to purchaser.
B. All faceplates and termination hardware shall be sourced from the certifying manufacturer to assure quality control and validity of the manufacturer's warranty.
C. The Contractor shall accept complete responsibility for the installation, certification, and support of the cabling system. Contractor must show proof that he has the certifying manufacturer's support on all of these issues.
D. All work shall be performed and supervised by Telecommunications Technicians and Project Managers who are qualified to install voice, data, and image cabling systems, and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
E. The Telecommunications Technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed. Evidence that the vendor is a current Certified Installer of the manufacturer must be provided in writing prior to work commencing on the structured cabling for the building.
F. The Contractor (including Subcontractor(s) if any) shall have a proven track record in cabling projects. This must be shown by the inclusion of details of at least 3 projects involving Category 6 or better cabling and optical fiber, which have been completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the 3 projects shall be included.

1.08 CONTRACTOR –AUDIO/VIDEO

A. The Contractor shall accept complete responsibility for the installation, certification, and support of the system. Contractor shall show proof that they have the certifying manufacturer's support on all of these issues.
B. All work shall be performed and supervised by Audio/Video Technicians and Project Managers who are qualified to install audio/video systems and cabling and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
C. The Audio/Video Technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed.
D. The vendor (including Subcontractor(s) if any) shall have a proven track record in audio/video system configuration and installation. This must be shown by the inclusion of details of at least 3 projects involving the installation of like sized audio/video systems that have been completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the three projects shall be included.

1.09 CONTRACTOR –SECURITY

A. The Contractor shall show proof of an existing contractual relationship with the approved equipment manufacturer of the video security system and access control system and shall pass through the manufacturer's certification to purchaser.

B. All hardware shall be sourced from the certifying manufacturer to assure quality control and validity of the manufacturer's warranty.
C. The Contractor shall accept complete responsibility for the installation, certification, and support of the security system. Contractor must show proof that he has the certifying manufacturer's support on all of these issues.
D. All work shall be performed and supervised by security technicians and project managers who are qualified to install security systems, and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
E. The security technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed. Evidence that the vendor is a current certified installer of the manufacturer must be provided in writing prior to work commencing on the video security system.
F. The Contractor (including Subcontractor(s) if any) shall have a proven track record in security projects. This must be shown by the inclusion of details of at least 3 projects similar in scope and requirements which have been completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the 3 projects shall be included.

PART 2 - PRODUCTS

2.01 FIRESTOPPING

A. Each contractor shall be responsible for firestopping around their cables and the raceways.
B. Shall be completed inside and around all conduits after cable installation.
C. Firestop for the area between the cable and the edge of the conduit shall be Nelson No. FSP, CLK or LBS+. Contractor shall install the best firestop for each individual installation.
    1. Firestop shall be installed with regard to local and national building codes.
    2. The firestop shall be a putty like substance that expands under heat and will not allow flame to pass for a designated period of time.
    3. Firestop shall conform to all NEC, NFPA, and UL requirements.
    4. Some wall pass-thru’ s are shown on the drawings. The Contractor shall utilize these where possible.
    5. Where the contractor must install cables through a wall where there is no pass-thru already provided, the Contractor shall be responsible for installing a fire-rated pass-thru and fire-stopping the conduit after cable installation.
D. Firestopping is required at all riser conduits and all pass thru’s.
    1. Each cable tray penetration of a wall shall be firestopped after cable installation. Use pillow type firestop to allow additional cables to be installed in the future.
    2. Where riser conduits pass through floors, the area between the concrete and the conduit shall be firestopped. This shall be completed with a putty or liquid firestop product. Fill in the space with mineral wool, and then install the firestop on top. All firestop shall be of sufficient thickness to secure the rating required by code.
    3. After final cable installation, install a putty firestop around all cables where they enter and exit conduit pass thru’s and conduit risers.
    4. All firestop shall be installed to provide the fire rating as described by local fire code.

5. It shall be the responsibility of the Contractor to verify that all conduits, walls, and raceways required to be firestopped have been firestopped.

E. Contractor shall provide a label at each penetration and firestop location detailing the UL rated fireproofing solution that was used in the specific application.
   1. Apply sticker to the wall near the firestopped conduit.
   2. Provide a sample of the label to the designer for review as part of the submittals.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Contractor shall be familiar with the location(s) where the work will be done. No additional compensation will be made for items the Contractor claims he was not aware of during bidding.

B. Work Area:
   1. All work areas shall be cleaned at the end of each day. All debris shall be cleaned and removed from the site and disposed of in the approved container for the site.
   2. All equipment shall be moved out of common areas and stored in the Contractor's lay down area, or in other approved storage locations on site.
   3. Any work that is low hanging, or may otherwise impede the general use of the space, and cannot be removed, shall be flagged and cordoned off by the Contractor.

C. All equipment and parts shall be installed in a neat and workmanlike manner. Good installation principles shall be used throughout the project.

D. All cables routed above the drop ceiling or in the ceiling area shall be installed square to the building. Diagonal cable runs are not permissible.

E. All cut edges of conduits, boxes, raceway, etc., shall be trimmed and filed so that no burrs or rough edges will damage cable as it is installed.

F. All surface raceways, including conduits in exposed areas shall be painted to match the existing colors of the surrounding area.

G. If, in the course of the work, the Contractor damages, marks, or misplaces any ceiling tiles, the Contractor shall repair, and/or replace the ceiling tile to the original condition.
   1. The Engineer shall decide if ceiling tiles have been damaged. Based on the Contractors proposed fixes, the Engineer shall decide the best course of action to repair any damage done by the Contractor to the ceiling tiles.

H. It shall be the responsibility of the Contractor to repair any damage done to the structure or finishes in the building by the Contractor. The building shall be returned to its original condition prior to final sign off of the project.

I. Firestop shall be installed to meet national and local codes.

3.02 DOCUMENTS

A. The Contractor shall fully read the contract documents including the detailed specifications, and the detailed drawings.

B. No additional compensation shall be made for any portion of the project which the Contractor did not know of or understand prior to providing the bid response.

C. In the case of any discrepancies between the detailed drawings and the detailed specifications, the Contractor shall provide the higher quality or more stringent requirement.

3.03 WORK PLAN-POST BID (CHOSEN CONTRACTOR ONLY)

A. Along with the submittals the Contractor shall provide a work plan for the implementation of the system they are installing. The plan shall include scheduled dates for major milestones, and all phases required for completion prior to final cutover.

B. The work plan shall list all items that must be completed by the Contractor or Owner to provide a smooth install of the system. The Contractor shall be responsible for all costs associated with the planning and cutover. The Owners only responsibility is to act as a liaison between the Contractor and the users.

C. The work plans shall include a time-line and a cutover date for the systems within each building. Contractor shall be responsible for all aspects of scheduling the work, including notification of the users, the administration, and the telephone service provider.

D. The work shall commence within 10 days of award of the contract. The Contractor shall be responsible for attending weekly project meetings at the Owner’s site to report on progress and keep the project team informed of the work being done

E. The work plan will be reviewed at each project meeting for compliance and updates.

F. Work shall immediately begin on site surveys to determine the existing infrastructure, conduit and raceway placement and determining placement of new system equipment. The Contractor shall be responsible for moving, relocating, and reconnecting any and all existing equipment required for the installation of the new systems.

G. After work plan and system approval by the Engineer the Contractor can begin work on infrastructure work that does not impede users.

H. The Contractor shall be responsible for working with the Owner’s Information Technology staff and administrators.

END OF SECTION 281000

SECTION 281100 – COMMUNICATIONS ROOM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Parts and equipment required for equipment in the communications room (Comm Room)

1.02 SYSTEM DESCRIPTION

A. All equipment in the communications room shall be installed so that access is provided to all components, mechanical and electrical.

B. All components of the communications room shall work together to form a cohesive and complete communications infrastructure.

1.03 COORDINATION

A. Coordinate rack/cabinet work with the Electrical Contractor for placement of electrical connections.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved Equals for Racks and Cable Ladder Hardware:
   1. Hubbell.
   2. Ortronics
   3. Panduit.
   4. Great Lakes Case and Cabinet.
   5. Middle Atlantic.
   6. Hoffman

2.02 COMMUNICATIONS ROOM EQUIPMENT

A. Patch Cord Organizers:
   1. Patch cords organizers shall be steel and shall allow routing of patch cables from electronics to the patch panels.
   2. Single rack unit organizer shall be Hubbell #HS13C with cover. Refer to PCO-1 on detailed drawings.
   3. Approved equals, Ortronics and Great Lakes Case and Cabinet.

B. Tie Wraps:
   1. Tie wraps shall be used on exterior cables only.
   2. Tie wraps should not be used above the drop ceiling or in cable tray. The pathway shall support the cables without the use of extra tie wraps.
   3. Tie wraps shall never be used to support cables from building structure, electrical conduits, or lighting systems.
   4. Panduit No. PLT2S-C or equal standard tie wrap. For use in general locations that are not plenum rated.
   5. Panduit No. PLT2S-C702 or equal plenum rated tie wrap. Use only this type of tie wrap in plenum rated areas.
   6. Panduit No. PLT2H-L00 or equal ultraviolet rated outside plant tie wrap. Use only this type of tie wrap for outside uses.

C. Hook and Loop Wraps:
   1. Hook and Loop wraps shall be used on the cable ladder of the rack systems to bundle the cables as they pass along the cable ladder. Cables shall be bundled in groups of no more than 24 cables.
   2. Hook and Loop wraps should not be used above the drop ceiling or in cable tray except in limited circumstances. The pathway shall support the cables without the use of extra tie wraps.
   3. Wraps shall never be used to support cables from building structure, electrical conduits, or lighting systems.
   4. Panduit HLT2I or equal.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Location of the communications infrastructure shall be finalized in the communications room prior to installation.
B. Locate all equipment to be installed and make certain that space is available for maintenance and service during the life of the system.
C. If any changes from the drawings are required, the Contractor shall submit a proposed layout of the communications room to the Engineer for approval prior to installation.

3.02 PREPARATION
A. Clean floor prior to installation of the communications racks.
B. Coordinate with all other Contractors and ensure that the locations of all cable tray and conduits are correct and will feed the rack system adequately.

3.03 INSTALLATION OF COMM ROOM EQUIPMENT
A. Patch cord organizers shall be installed between all patch panels and electronics.
   1. Horizontal organizers shall be used for routing fiber and copper patch cords between patch panels and electronics.
   2. Refer to Rack layouts on detailed drawings for quantity of organizers to provide.
   3. Organizers shall be installed side by side where multiple racks are installed.
   4. If changes in the rack layout are required, contact the Engineer and get changes approved prior to installation.
B. Tie wraps shall be used sparingly in the overall installation.
   1. Tie wraps shall not be used in the cable tray or above the drop ceiling for support of cables. All cables shall utilize J-hooks, conduits, cable ladder, or cable tray for support in the ceiling area.
   2. Tie wraps can be used to group cables on the cable ladder of the rack systems. Group cables in bundles of no more than 24 cables.
   3. Trim all tie wraps so that the cut edge is smooth.
C. Hook and Loop shall be used sparingly in the overall installation.
   1. Hook and Loop should not be used in the cable tray or above the drop ceiling for support of cables. All cables shall utilize J-hooks, conduits, cable ladder, or cable tray for support in the ceiling area.
   2. Hook and Loop can be used to group cables on the cable ladder of the rack systems. Group cables in bundles of no more than 24 cables.

END OF SECTION 281100

SECTION 281600 – CAT-6 CABLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes parts and equipment required for installation, termination, and testing of user communications cables.

1.02 SYSTEM DESCRIPTION

A. The horizontal cabling consists of all systems from the user faceplate, to the patch panel in the communications room, and all connections in between.

B. Products and installation detailed in this section shall comply with all applicable requirements.

1. ANSI/TIA-568-C.0, "*Generic Telecommunications* Cabling *for Customer Premises*",
2. ANSI/TIA-568-C.1, "*Commercial Building Telecommunications Cabling Standard*",
3. ANSI/TIA-568-C.2, "*Balanced Twisted-Pair Telecommunication Cabling and Components Standard*", ANSI/TIA-568-C.3, "*Optical Fiber Cabling Components Standard*",
4. ANSI/TIA-568-C.4, "*Broadband Coaxial Cabling and Components Standard*",
5. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
6. IA-606-B: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings including all Updates and Addenda.
7. TIA-607-C: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
8. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
9. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
10. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
11. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
12. IEEE 802.3bt -Amendment 2. Ratified in 2018 PoE standards powering all 4 pairs:

1.03 COORDINATION

A. All cables shall be coordinated with the installation of the telecommunications raceways.

B. Coordinate all user cables with the furniture to be installed in the building. Make any adjustments prior to cable being installed.

C. Contractor shall walk the site during construction and shall verify all raceways are being installed as required to install the user data cables. Walk the site prior to drywall being installed or floors being installed when Floor boxes are being installed.

1.04 STANDARDS

A. Cabling shall be installed in accordance with NEC code for grouping/bundling of cables in relation to Type 3 and Type 4 PoE
B. Install as per NEC 840.160 in reference to bundling cables:

AWG	Numberof 4-Pair Cables in a Bundle																				
	1			2-7			8-19			20-37			38-61			62-91			92-192		
	Temp Rating			Temp Rating			Temp Rating			Temp Rating			Temp Rating			Temp Rating			Temp Rating		
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1.0	1.0	1.0	1.0	1.0	1.0	0.7	0.8	1.0	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6	NA	NA	NA
24	2.0	2.0	2.0	1.0	1.4	1.6	0.8	1.0	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
22	3.0	3.0	3.0	1.4	1.8	2.1	1.0	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.7	0.8	0.5	0.6	0.7

C. Cables shall be installed with no more than 24 cables in a single J-hook. Install additional J-hooks as required.
D. If cables are to be bundled/grouped in larger bundles then the cable shall be LP listed per UL.
E. All cables shall be no smaller than 23 AWG.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved vendors for copper user cables are:
   1. Panduit
   2. Hubbell
   3. Belden
   4. CommScope
   5. Mohawk
   6. Superior Essex
B. Approved vendors for CAT-6 termination equipment are:
   1. Hubbell.
   2. Panduit
   3. Belden
   4. CommScope

2.02 CAT-6 CABLING

A. All UTP user/cabling installed shall be CAT-6 rated or above.
   1. Category 6 cabling shall consist of 4 pairs of unshielded twisted pair, 23 AWG cables.
   2. All CAT-6 cables shall be installed in cable tray or supported by J-Hooks.
   3. Individual pair shall be marked in the standard 4 pair color code of blue/blue-white, orange/orange-white, green/green-white, and brown/brown-white.
   4. Each cable shall be marked sequentially with the footage of the cable. Each cable shall also be marked with the manufacturer of the cable and the type of cable installed or the cable part number.
   5. Cable and all connectors and patch panels shall meet or exceed the following electrical and physical requirements:

DC RESISTANCE (max)	23 AWG
Ohms/100m @ 20°C	9.38ohms

DC RESISTANCE UNBALANCED (max)	
Individual Pair %	5%

CHARACTERISTIC IMPEDANCE	
Frequency (f)	Ohms
1-500 Mhz	100 ±15

DELAY SKEW (max)	
ns/100m	45

NOMINAL VELOCITY OF PROPAGATION (NVP)	
% Speed of light	72

INPUT IMPEDANCE	
Frequency (f)	Ohms
1.0-100 Mhz	100 ±15
100-350 Mhz	100 ±20
350-500 Mhz	100 ±25

REFERENCE ELECTRICAL CHARACTERISTICS

FREQ (MHz)	INSERTION LOSS (dB/100m)		NEXT (dB/100m)		ACR (dB/100m)	PS-NEXT (dB/100m)		PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)	RL (dB)
	avg	max	avg	min	min	avg	min	min	min	min	min
.772	1.7	1.8	82	76.0	74.2	77	74.0	72.2	–	–	–
1.0	1.9	2.0	80	74.3	72.3	75	72.3	70.3	67.8	64.8	20.0
4.0	3.6	3.8	71	65.3	61.5	66	63.3	59.5	55.8	52.8	23.0
8.0	5.1	5.3	67	60.8	55.5	62	58.8	53.5	49.7	46.7	24.5
10.0	5.7	6.0	65	59.3	53.3	60	57.3	51.3	47.8	44.8	25.0
16.0	7.3	7.6	62	56.2	48.6	57	54.2	46.6	43.7	40.7	25.0
20.0	8.1	8.5	61	54.8	46.3	56	52.8	44.3	41.8	38.8	25.0
25.0	9.1	9.5	59	53.3	43.8	54	51.3	41.8	39.8	36.8	24.3
31.25	10.2	10.7	58	51.9	41.2	53	49.9	39.2	37.9	34.9	23.6
62.5	14.8	15.4	53	47.4	32.0	48	45.4	30.0	31.9	28.9	21.5
100.0	19.0	19.8	50	44.3	24.5	45	42.3	22.5	27.8	24.8	20.1
155.0	24.2	25.2	47	41.4	16.3	42	39.4	14.3	24.0	21.0	18.8
200.0	27.8	29.0	46	39.8	10.8	41	37.8	8.8	21.8	18.8	18.0
250.0	31.5	32.8	44	38.3	5.5	39	36.3	3.5	19.8	16.8	17.3
300.0	35.0	36.4	43	37.1	0.7	38	35.1	--	18.3	15.3	16.8
350.0	38.2	39.8	42	36.1	--	37	34.1	--	16.9	13.9	16.3
400.0	41.3	43.0	41	35.3	--	36	33.3	--	15.8	12.8	15.9
500.0	47.0	48.9	40	33.8	--	35	31.8	--	13.8	10.8	15.2
550.0	49.7	51.8	39	33.2	--	34	31.2	--	13.0	10.0	14.9

6. All cables installed above a drop ceiling or fixed ceiling shall be Plenum Rated
7. CAT-6, 4 pair cabling shall be plenum rated unless specifically noted.

Cable Use	Manufacturer	Color	Part number	Rating
Data Cabling	Mohawk	Blue	M58281	Plenum
Security Camera	Mohawk	Green	M58286	Plenum
Wireless AP	Mohawk	Yellow	M58283	Plenum
IP/POE locks at doors	Mohawk	White	M58280	Plenum

Audio/ video	Mohawk	Black	M58289	Plenum
Backbone	Mohawk	Purple	M58290	Plenum
USB	Mohawk	Orange	M58288	Plenum
Underground	Mohawk	Black	M58772	Underground
Shielded Underground Rated	Belden	Black	OSPF6F	Underground / Shielded

8. Ensure that cable passes all CAT-6 tests after installation.

2.03 UTP JACKS

A. 8-position modular jacks for termination at user and at the patch panel. Match cable color except where noted on drawings.
   1. Each jack shall be an individually constructed unit and shall snap mount in an industry standard keystone opening (.760 inches x .580 inches).
   2. Jack housings shall be high impact 94 V-0 rated thermoplastic.
   3. Jack housings shall fully encase and protect printed circuit boards and IDC fields.
   4. Modular jack contacts shall accept a minimum of 1000 mating cycles with 5.0 milliohm (maximum) increase over initial with the use of an FCC compliant plug.
   5. Modular jack contact wires shall be formed flat for increased surface contact with mated plugs.
   6. Modular jack contacts shall be constructed of beryllium copper for maximum spring force and resilience.
   7. Contact plating shall be a minimum of 50 micro inches of hard gold in the contact area over 50 micro inches of nickel.
   8. Jack termination shall follow the industry standard 110 IDC.
   9. Jacks shall have a designation indicating CAT-6 or CAT-6A as required.
   10. Jacks shall utilize a paired punch down sequence. Cable pair twist shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
   11. Jacks shall terminate 22-26 AWG stranded or solid conductors.
   12. Jacks shall terminate insulated conductors with outside diameters up to .050 inches.
   13. Jacks shall be compatible with single conductor, 110 impact termination tools.
   14. Jacks shall include translucent wire retention stuffer cap that holds terminated wires in place and allows the conductors to be visually inspected in the IDC housing.
   15. Jacks shall be compatible with EIA/TIA 606A color code labeling.
   16. Jacks shall accept snap on icons for identification or designation of applications.
   17. Jacks shall be marked for T568A and T568B wiring schemes. TIA 568B wiring shall be used in all terminations throughout the communications system.
   18. All CAT-6 modular jacks and panels shall meet or exceed the following transmission characteristics:
      a. Jacks shall be designed for 100 Ohm UTP cable termination.
      b. Jacks shall be UL verified for TIA/EIA Category 6 electrical performance.
      c. Jacks shall be UL listed 1863 and CSA certified.
      d. Jacks shall be manufactured by an ISO 9002 registered manufacturer.
   19. CAT-6, 8-pin modular jacks shall be:

a. Data Jacks shall be Hubbell # HXJ6OW or equal. Office White.
b. Data Jacks for Security Cameras shall be Hubbell #HXJ6GN-Green
c. Data jacks for Wireless Access Points shall be Hubbell #HXJ6Y-Yellow
d. Data Jacks for Audio and Video connections shall be:
   1) Hubbell #HXJ6BK-Black
e. Data Jacks for USB connections shall be Hubbell #HXJ6OR-Orange

2.04 FACEPLATES

A. Standard flush mount faceplates shall support all the jacks and connectors required.
1. Faceplates shall be UL listed and CSA certified.
2. Faceplates shall be constructed of high impact thermoplastic or stainless steel. See drawings for specific requirements.
3. Faceplates shall be 2-3/4 inches wide x 4-1/2 inches high (69.8 mm x 114.3 mm) for single gang, and 4-1/2 inches x 4-1/2 inches (114.3 x 114.3 mm) for double gang.
4. Faceplates shall be available to mount 1, 2, 3, 4, or 6 jacks in a single gang and up to 12 jacks in a double gang configuration.
5. Faceplates shall provide for TIA/EIA 606 compliant station labeling.
6. Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
7. Each plate shall be fully configured with modular inserts. There shall be no open spaces in the faceplate.
8. Match the color of the modular inserts to the color of the faceplate. All faceplates and inserts shall be office white unless otherwise noted.
9. Single gang plastic faceplate shall be Hubbell # IMF1OW.
10. Double gang plastic plate shall be Hubbell # IMF2OW.
11. Sing Gang, stainless steel, modular faceplates shall be Hubbell #IMSS1
12. Double Gang, stainless steel, modular faceplates shall be Hubbell #IMSS2
13. Each single gang plate has 3 faceplate units (FPU's) available to install inserts. Double gang plates have 2 sides, each with 3 FPU's.
14. Equip plates with the following parts as directed on the construction drawings.

FPU	ITEM	PART NUMBER
	Blank Jack	SFB10
.5	Blank	IMB05OW
1	Blank	IMB1OW
1.5	Blank	IMB15OW
1	1 Port Flat	IM1K1OW
1	2 Port Flat	IM2K1OW
1.5	1 Port Angled	IM1KA15OW
1.5	2 Port Angled	IM2KA15OW
1.5	SC Angled	IM1SCA15OW
2	Two SC Angled	IM2SCA2OW

B. Some locations will require custom stainless steel plates. These shall be configured with the correct connectors and pass thru's to support all the data, audio and video.
1. All shall be silk-screened to detail what each connector is for.
2. Submit a product sheet for approval prior to purchase of the plates.
3. UTP Jacks shall be flush with the front of the plate

C. Wall mount phone plates shall be stainless steel.
   1. Each plate shall be equipped with a CAT-6, 8 port modular jack.
   2. Each plate shall be equipped with stainless steel studs for mounting a wall mount telephone to the plate.
   3. Single gang wall mount phone plate shall be Hubbell #SP6F or #SP6R base on telephone type. Coordinate with owner prior to ordering.

D. In addition to flush faceplates and surface housings, some installations call for integrated furniture outlets, GFI style outlets, and standard 106 style frames. These may be required at some surface raceway location. Field verify prior to ordering.
   1. The Contractors shall identify which type of outlet or frame is required at each location throughout the system.
   2. Match the outlet with the faceplate required.
   3. GFI, more commonly referred to as style line outlets, are rectangular and fit in a rectangular plate used for GFI receptacles.
   4. Each type of modular furniture has certain requirements for its voice and data modules. The Contractor shall coordinate with the furniture installer and provide the correct faceplate and outlets to match the color and style of the furniture.
   5. The 106 style frame fits in a common duplex electrical receptacle faceplate. The frame holds 2 or 4 modular jacks.
   6. For all connections that do not have a faceplate with a location for a laser printed paper label, the Contractor shall provide an engraved lamacoid label detailing the location number of each cable.
   7. GFI/Style line Plates shall be:
      a. Two port, Hubbell # NS612W
      b. Three port, Hubbell # NS613W,
      c. Four port, Hubbell # NS614W
   8. 106 style plates shall be
      a. Two port, Hubbell #BR106C
      b. Four Port, Hubbell #Q106O

2.05 SURFACE MOUNT BOXES

A. Provide surface mount boxes for termination of cables as shown on the drawings.
   1. Install a surface mount box at location for termination of the modular jacks.
   2. One port surface box shall be Hubbell #HSB1OW.
   3. Two port surface box shall be Hubbell #HSB2OW
   4. Four Port Surface box shall be Hubbell #HSB4OW
   5. For all plenum rated ceilings and areas the contract shall provide plenum rated surface mount boxes. For Hubbell products. Add a “P” to the end of the part number.

2.06 CABLE SUPPORTS

A. All cables shall be supported in the ceiling a minimum of every 5 feet. Support can be provided by installing cable inside cable tray or conduit, or by installing J-hooks every 5 feet.
   1. J-hooks shall provide a smooth steel or plenum rated plastic, support for cables as they route through the ceiling.
   2. Steel supports shall have a galvanized finish.
   3. Steel, UL listed, ultimate static load limit 50 pounds rated to support Category 5e and higher cables, and optical fiber cables.
   4. If required, assemble to manufacturer recommended specialty fasteners, including beam clips and flange clips.

5. Acceptable products shall be:
   a. CADDY #CAT HP series with retainer hooks.
   b. CADDY #CAT-CM SERIES
6. Provide with interfaces and clamps required to support J-Hooks from the building structure.
7. Provide threaded rod and associated hardware required to support all J-Hooks
8. No more than 24 voice/data cables in each J-hook. Provide additional hooks as required.

2.07 RACK MOUNTED PATCH PANELS

A. Patch panels for termination of UTP cabling shall be provided to terminate all cables installed in the building.
B. All patch panels shall be installed into 19” racks and/or cabinets as shown on the drawings.
C. Provide panels to terminate all cables even if the panels are not specifically shown on the rack layout drawings.
   1. Provide the quantity and color of Modular jacks to match the color and quantity of all cables installed.
D. Panels shall be steel and shall allow mounting of all CAT-6 an CAT-6A jacks. Panels shall be blank panels that accept all modular jacks.
E. CAT-6 patch panels for mounting in a 19-inch rack or cabinet. Shall be;
   1. Panels shall be made of black anodized aluminum, in 24 and 48 port configurations.
   2. Panels shall accommodate 24 ports for each rack mount space or "U" (1U = 44.5 mm [1.75 inch]).
   3. Panels shall be manufactured with a rolled edge at the top and bottom for stiffness.
F. 24 port empty patch panels shall be Hubbell #HPJ24 or equal
   1. Panels shall have rear cable support bar for strain relief which shall clip to the rear of the patch panel or to the rear of the rack rail.
   2. Each 24-port patch panel shall be equipped with one (1) rear cable organizer. Organizer shall be Hubbell #HPRCMB or equal.
   3. Ports shall be marked 1-24 on top of the openings by factory.
   4. Label all Panels for the panel, communications room and rack with a large laser-printed label.

2.08 PASS THRU’S

A. Where no pass-thru is provided by others the contractor shall install conduit or UL listed wall pass thru’s sized as required to route all cables through all walls.
B. Pass thru’s shall be EMT conduit or another UL listed rated device.
C. Install thru all drywall, block, concrete walls and through any floors required to be penetrated
D. Conduit shall be supported mechanically from the wall or floor structure. After installation, the raceway shall be firestopped to meet the requirements of the wall or floor.
E. Install a sticker on the wall, next to the pass thru, listing the UL approved method that was used to firestop the pass thru or conduit.

PART 3 - EXECUTION

3.01 EXAMINATION

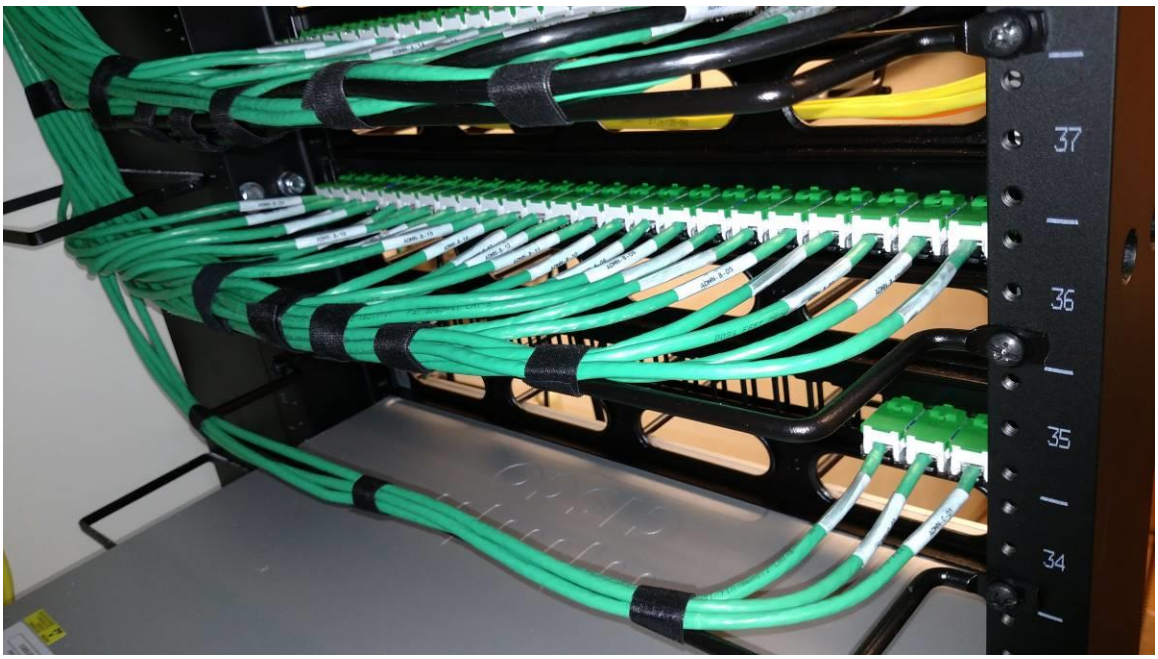
A. Examine all pathways prior to installation of all cables.
B. Identify locations of all user conduits and backboxes prior to cable installation.
   1. Walk the site during conduit installation and ensure that all boxes are installed where required for termination of all cables.
   2. If any missing locations are not noted during electrical raceway installation the contractor shall be required to fish the wall or install surface raceway to support the cable terminations
C. The Engineer or the Owner has the right to make adjustments to the location of any outlet to a new location within 7 wall-feet of the original location. If the change is made prior to final cable termination, and prior to any raceway being installed, then the changes shall be a no cost change to the contract.
D. Identify all locations where cable will route through furniture raceway or other nonstandard conduit or raceway installation. Make arrangements to install and terminate all cables in accordance with TIA/EIA 568 standards.

3.02 PREPARATION
A. Locate main path for all cables and install J-hooks where cable tray or raceway is not provided.
B. Coordinate with other trades to install a clear, straight path down major corridors for the routing of user cables back to the communications closet.
C. Plan installation of cables along cable ladder of rack system in communications room. All cable shall be neatly routed in groups of no more than 24 cables.

3.03 INSTALLATION
A. CAT-6 cabling shall be installed according to TIA/EIA 568 standards, including all updates and addenda.
   1. When installing CAT-X cables, care shall be taken to avoid crimping or bending the cable past the manufacturer’s recommended bend radius.
   2. During installation, the cables shall not be pulled across the ceiling tiles or the structure of the building. This may cause damage to the cable jacket.
   3. Adhere to all pulling tensions and bend radii during installation. Excessive pulling or bending can cause the cable to fail tests after installation. Any cable that does not pass the certification tests after installation shall be fixed or replaced at the Contractor’s expense.
   4. All cables shall route neatly in the ceiling. Whether they route in cable tray or J-hooks, the cables shall be neat and orderly.
   5. There shall be no more than 24 cables in each J-hook. Provide additional J-hooks as required.
   6. Support all cables at a minimum of every 5 feet.
   7. Provide a short coil of extra cable where the cable enters the vertical conduit. The coil shall consist of no less than 1-1/2 feet.
   8. Provide enough slack in the backbox to fully remove the faceplate and jack and allow work to be done on the cable.
   9. When installing cables in the communications room, all cable shall route neatly through the cable tray and cable ladder.
   10. When transitioning from the ceiling area to the cable ladder of the rack system, all cable shall route through conduits or be attached to vertical section of cable ladder. The Contractor shall provide the conduits shown and any additional conduits or cable ladder required to neatly transition cables from the ceiling to the rack.

11. Bundle cables in groups of no more than 24 cables as it routes along the cable ladder.
12. Cables shall route down each side of a rack for termination. Split each panel into 2 sides. The first 12 positions on a panel are on the left, and positions 13 through 24 are on the right. Route the cables for panel positions 1 through 12 down the left cable ladder and route the cables for positions 13 through 24 down the right cable ladder.
13. Each patch panel shall utilize a rear organizer for holding the cables as they route to the punchdown field.
14. Cables shall be bundled in groups of 4 as they route through the rear cable organizer.
15. When terminating cables, ensure that the smallest amount of jacket is removed from the final termination point of the cables.
16. Pair twists shall be maintained up to the IDC jack for all the cables.
17. Provide a service loop of the cables on the vertical cable ladder. The loop shall extend no less than 1 foot below the termination point on the patch panel. Route the cables 1 foot below the patch panel, and then back up to the panel. This will provide room for future moves and additions to the rack.
18. Each cable shall have a self adhesive, self laminating, laser printed label at each end. The label shall show the location identifier of that cable. Labels shall be installed no more than 4 inches from the termination point of the cable.

B. All work on the project shall meet all applicable state, federal, local and industry codes and be installed according to the requirements of he Authority Having Jurisdiction (AHJ).



Detail 01. Proper routing and support of cables on rear organizer. Where possible route 12 cables from right side and 12 cables from left side. This rack in picture did not have right side organizer.

C. CAT-6 data jacks shall be installed at the user end of each UTP cable installed in the system.

1. Jacks shall be installed to provide minimal signal impairment by preserving wire pair twists as close as possible to the point of mechanical termination.
2. Jacks shall be installed per manufacturer's instructions and properly mounted in plates, frames, housings, or other appropriate mounting devices.
3. Jacks shall be installed such that cables terminated to the jacks maintain minimum bend radius of at least 4 times the cable diameter into the workstation outlet. Cables shall be terminated on jacks such that there is no tension on the conductors in the termination contacts.
4. See drawings for the color requirements of all modular jacks.

D. Faceplates shall be mounted straight and level with the floor and walls of the building.
1. Jacks and/or connectors shall be terminated to the appropriate cable and inserted in the correct orientation into the faceplate prior to the mounting of the faceplate.
2. Jacks shall be inserted into the faceplate left to right, then top to bottom. 2 gang plates shall be labeled left to right, then top to bottom for each gang.
3. Cable slack shall be stored behind the faceplate in such a way that allows the minimum bend radius of the cables to be maintained as per the following:
4. Care shall be taken when mounting the faceplate to avoid crimping or kinking the cables.
5. Faceplates shall be securely mounted to a surface mounted housing, a recessed box, or box eliminator bracket.
6. Each faceplate shall be labeled with laser printed paper inserted behind the clear plastic label strips.
7. The label shall show the location identifier of the faceplate and the letter designation for each cable. The label shall be as large a font as possible and easily readable.
8. Each faceplate comes with a label strip at the top and the bottom.

E. Wall mount phone plates shall be mounted to a backbox or a drywall ring securely installed to the wall.
1. Terminate the cable to the 8-position jack on the wall mount faceplate.
2. Ensure that the faceplate is at the correct height for all ADA requirements.
3. Provide an adhesive label on the faceplate identifying the cable with its location identifier number.

F. When utilizing 106 style or GFI/Style-Line brackets, the Contractor shall provide self adhesive labels detailing which cable is at each position.
1. 106 plates and GFI plates will primarily be located in floorboxes or surface raceway.
2. The contractor shall coordinate the faceplates required with the actual floorboxes installed by the electrical contractor.
3. Provide the quantity of GFI and 106 style plates required.

G. Surface Mount boxes
1. Modular Jacks and/or connectors shall be terminated to the appropriate cable and inserted in the correct orientation into the surface mount box.
2. When the surface mount jack is mounted above the ceiling the cable shall be coiled and the cable and surface mount box shall be kept off of the ceiling grid
3. Attach the coil to the building structure with a plenum rated tie-wrap.
4. Label each surface mount box for the cable number. Also, install a wrap-around label on each cable.
5. When attaching a surface mount box to a piece of furniture or to a power pole the contractor shall drill a hole in the furniture/pole that is larger than the hole on the back of the surface box.

6. Screw the surface box to the furniture or to the pole. Adhesive only solutions are not adequate.

H. Proper support of cables is of paramount importance when installing a cable infrastructure. All cables not in conduit or cable tray shall be supported via J-hooks a minimum of every 5 feet.
   1. Routes of cables shall be parallel or perpendicular to the walls of the building.
   2. Install the J-hooks to minimize changes in the level of the cables as they route through the J-hooks.
   3. Do not install more than 50 cables in any 1 J-hook. Provide additional hooks where more than 50 cables route along a main route.
   4. All communications shall route as high in the ceiling as possible while still being accessible and staying away from other utilities.
   5. When installing the cable through the J-hooks, they shall all have relatively the same droop between hooks. All cables shall be installed neatly and squarely.
   6. Secure the J-hooks to the building structure with beam clamps and threaded rod as required to support the cables.
   7. J-hooks shall never be attached to drop ceiling support wires. Cables shall never be supported by drop ceiling wires.

I. CAT-6 patch panels shall be installed in the racks.
   1. Panels shall be installed to provide minimal signal impairment by preserving wire pair twists as closely as possible to the point of mechanical termination. The amount of untwisting in a pair as a result of termination to the modular jack at the patch panel shall be no greater than a 1/2 inch (13 mm).
   2. Panels shall be installed per manufacturer’s instructions and properly mounted to a rack, cabinet, bracket, or other appropriate mounting device.
   3. Panels shall be installed such that cables terminated to the panel can maintain minimum bend radius of at least 4 times the cable diameter into the IDC contacts. Cables shall be terminated on the panels such that there is no tension on the conductors in the termination contacts.
   4. Each patch panel shall have a rear cable organizer for routing cable from the vertical cable ladder to the patch panel. 1 organizer for each row of 24 cables.
   5. The label for each outlet on the panel shall be the same as the wraparound label on each end of the cable.
   6. Each label shall line up directly below or above the outlet on the panel. Misaligned labels will not be permitted.

END OF SECTION 281600

SECTION 281700 – CLOCK SYSTEM -IP-Poe

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section provides a project overview and general project and Contractor requirements for the Internet Protocol (IP) Power over Ethernet (PoE) clock system

1.02 DESCRIPTION OF PROJECT

A. The building shall receive an entirely controlled master clock system and associated IP clocks. CAT-6 cables shall be used from the clock to the comm room for connectivity. See drawing and specs for contractor that is to install the cables
   1. The system shall consist of, but not be limited to clocks and antenna systems that transmit the time to the clocks.

1.03 CONTRACTOR

A. The Contractor shall accept complete responsibility for the installation, certification, and support of the system. Contractor must show proof that they have the certifying manufacturer's support on all of these issues.
B. All work shall be performed and supervised by technicians and project managers who are qualified to install the clock system and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The manufacturer of the wireless master clock system shall have been designing, manufacturing, and installing systems for a period of no less than 3 years.
B. Approved manufacturers for the paging bell system are:
   1. Sapling
   2. Others as equal.

2.02 MATERIALS

A. Digital IP Clocks:
   1. All clocks shall be digital clocks with green digits. Red Digits are not allowed
   2. Clocks shall have integral receivers that attach to the Ethernet network and derive power from the PoE on the Ethernet cable.
   3. Provide custom backbox for flush mounting in new walls.
      a. Provide backbox to electrical contractor or cabling contractor who is installing raceway.
   4. Provide custom backbox for surface mounting in existing walls. Provide raceway to accessible ceiling from the backbox.
   5. Clocks shall be self-correcting at a minimum of each hour.
   6. Clocks shall have the following specifications or better:
      a. Power over Ethernet (802.3af protocol)
      b. Power and synchronize clocks through one Ethernet cable using RJ45 connector
      c. Control all of your settings like Daylight Saving Time and countdown functions through an easy-to use web interface

d. Scheduled dimming schedules for digital clocks
e. Edit a specific clock's settings or apply settings to the entire clock system through one location
f. Available in different sizes
   A) 4" (10.16 cm) display
   B) 4-digit display
g. Automatic bi-annual Daylight Savings Time
h. Alternating time/date in both U.S and International formats
i. 12 or 24-hour display
j. Four levels of adjustable brightness

7. Digital PoE, IP clocks shall be Sapling SBP-3100 series, includes surface mount housing:
   a. Sapling Digital, IP, 3100 Model, 4.0", 4 Digits, PoE, Green Display, Surface Mount #SBP-31S-404-0G

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor shall be familiar with the location(s) where the work will be done. No additional compensation will be made for items the Contractor claims he was not aware of during bidding.

B. Work Area:
   1. All work areas shall be cleaned at the end of each day. All debris shall be cleaned and removed from the site and disposed of in the approved container for the site.
   2. All equipment shall be moved out of common areas and stored in the Contractor's lay down area, or in other approved storage locations on site.
   3. Any work that is low hanging, or may otherwise impede the general use of the space, and cannot be removed shall be flagged and cordoned off by the Contractor.

C. All equipment and parts shall be installed in a neat and workman like manner. Good installation principles shall be used throughout the project.

3.02 INSTALLATION

A. Clock Configuration.
   1. Configure each clock to point to the same NTP servers.
   2. Configure for each clock.
      a. Configure each clock with an IP address
      b. Name all clocks in the system
      c. Configure dimming schedules of each clock.
   3. All clocks shall be set to exactly the same time. The Contractor shall verify the correctness of the clocks.
   4. The clock system shall run for a minimum of 2 weeks prior to being turned over to the Owner. During that time, the Contractor shall keep a daily log of the time and ensure that the system is keeping the correct time each day. Any variations from the accepted standard time shall be noted and shall be corrected by the Contractor. The system shall not be turned over to the Owner until 2 straight

weeks have passed during which the system has been shown to keep the correct time.

B. Clock Connectivity
   1. Confirm with the cabling contractor (if cables are being installed by another contractor) how the cables shall be installed and terminated.
   2. Provide with all patch cables required at each end. At clock and at comm room
   3. Plug in each clock and confirm power and network connectivity.

C. Surface Mount Clocks
   1. Identify location of backboxes with electrician prior to installation.
   2. Install surface mount boxes to the backboxes in the wall.
   3. Connect network cables.

END OF SECTION 281700

SECTION 283500 – PHYSICAL ACCESS CONTROL SYSTEM (PACS)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes parts and equipment required for installation and termination of a building-wide Physical Access Control System (PACS). This system shall be referred to as the "security system", "system" or PACS throughout these specifications.

1.02 SYSTEM DESCRIPTION

A. The district and this building have an existing access control and intrusion detection system. Expand both for this project.
   1. Existing access control is the Continental Access system. Expand to support new doors.

B. The security system shall be supplied and installed by a Contractor able to show examples of similar projects and installations within the last 3 years.

C. The security system shall serve the building but shall be able to be expanded to serve additional buildings in the future.

D. The Security System shall provide a solution for access control and alarm monitoring. This shall be through a central server with PC attached workstations for monitoring and control. Shall include:
   1. Access Control
   2. Alarm Monitoring

E. Contractor shall provide all software required for connection of the security system to the in-house data network and associated control PC's.

F. The security system client-server architecture shall communicate with native TCP/IP over an existing Ethernet TCP/IP enterprise network.

1.03 COORDINATION

A. All cables shall be coordinated with the door hardware and security devices being installed as part of this project.

B. PACS cable shall be a unique color from the Telecommunications cable, fire alarm cable and lighting control cable. Coordinate this with the Electrical Contractor prior to ordering the equipment and installation of the cables.

1.04 PROJECT PLAN

A. Prior to ordering equipment and installation, the contractor shall provide a project plan to the owner and contractor that describes the system and its capabilities and the possible configurations.

B. Provide a project approach which describes the installation and implementation plan and schedule and all sequencing.

C. Meet with the owner numerous times to determine how the system should work and how it should be monitored.
   1. Configure the system prior to installation to meet these requirements. Demonstrate the system use to the owner prior to installation and obtain approval to move forward with the installation.

D. Generate a testing plan and have that plan approved by the owner and engineer prior to installing the system.
E. The system shall be installed and tested prior to cutting over any doors to the system. Provide and install temporary card readers, door contacts etc. to the system for testing. Demonstrate that this works prior to cutover.
F. Conduct all testing of the system
G. Conduct user training on the system
H. Provide as-built documentation of the installed system

1.05 RELATED STANDARDS

A. The security system shall conform to the following international and national standards:
   1. FCC Rules and Regulations
   2. UL 294 Access Control Systems
   3. UL 1076 Line Supervision
   4. 21 CFR part 11
   5. Part 15, Radio Frequency Devices
   6. National Electrical Manufacturers Association (NEMA.)
   7. Applicable Federal, State and Local laws, regulations, codes
   8. National Electrical Code (NEC)
   9. NFPA 80 National Fire Protection Agency - Fire Doors & Windows (edition is jurisdiction dependent).
   10. NFPA 101 National Fire Protection Agency - Life Safety Code (edition is jurisdiction dependent).
   11. NFPA 105 National Fire Protection Agency - Smoke Control Door Assembly (edition is jurisdiction dependent)
   12. ANSI 117.1 1992 Edition Providing Accessibility and Usability for Physically handicapped People.
   13. A.D.A.A.G Americans with Disabilities Act Accessibility Guidelines.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved vendors for security cables are:
   1. General Cable.
   2. Belden.
   3. West Penn Wire and Cable.
   4. Equivalent manufacturers.
B. Approved manufacturer for panels and power supplies are:
   1. Altronix
   2. Life Safety
C. Approved vendor for Physical Access Control System (PACS) equipment is:
   1. Continental Access
   2. No others are allowed.

2.02 DESCRIPTION OF PROJECT

A. Expand the existing system to support new access control equipment at each door as shown on the floorplans.

B. Where a door is being removed, remove the cabling and devices at a door. Re-install devices and cabling at the door. This occurs at each door that has existing access control equipment.
C. The system shall include all equipment, software, cabling, data collection points, card readers and hardware to monitor and control the specified buildings and provide reports to a security station as required by the owner.
D. If an Intrusion Detection system is specified, then the access control and intrusion detection system shall act as one system. They shall be integrated such that the presentation of a known access card will shunt all intrusion alarms for the door where the card was presented.
E. The system shall keep records of all access control card presentations.
F. The system shall connect to and interoperate with all the door hardware that which is existing and being added as part of this project.
G. The system shall be able to be connected to other buildings via the existing data network. Specify how the system will connect to other buildings as part of your bid response.
H. The Owner shall be able to change and monitor all settings for intrusion and access to all the buildings through the control PC.

2.03 MATERIALS
A. All security and control cables shall be plenum rated.
1. Contractor shall provide all appropriate cable from the door security hardware to the security system. All cabling shall be plenum rated.
2. Some locations require outdoor rated cabling. The contractor shall provide the cabling to match the required area.
3. There will be requirements for many different types of cabling and the contractor shall provide for each.
4. Provide a coil of cable at each location for moves and maintenance.
B. The system shall be fully configurable and compartmentalized so that any user can be assigned, and they will only see the status of doors at one building.
1. Based on a user's login, the system shall be configurable to restrict persons from seeing or controlling doors and lock schedules at building that they do not have permission to see or control.

2.04 SECURITY SYSTEM SERVER
A. Management Server:
1. Existing Continental Access System

2.05 ACCESS CONTROL SYSTEM SOFTWARE
A. Existing Continental Access System
B. Provide updated software and licensing to add devices as shown on the drawings.

2.06 SECURITY ENCLOSURE
A. Note that this is written around Mercury boards. Change part numbers to match the Continental Access panels if those are proprietary to their own hardware.
B. Shall be provided to hold power supplies, controllers, access control panels, card reader panels, input/output cards (now to be referred to as security panels) and any other components required for a complete access control system.
C. Security enclosures are the physical boxes and cabinets that support the intelligent controllers, I/O boards, power supplies and power distribution equipment.

D. Security panels hall be wall mounted and large enough to hold power equipment and access control system controllers and cards.
E. Security panel shall be:
   1. UL: Listed: UL 294 approved
   2. Enclosure shall accommodate power supply and sub-assemblies such as controllers and security cards to be provided as part of the project.
   3. Primary power input shall be 115VAC
   4. Physical
      a. Size enclosure as required to hold power supplies and security panels. Provide multiple enclosures where required.
      b. Made of 16 AWG sheet metal
      c. Shall have conduit knockouts or custom cut holes for access to the panels for cabling.
      d. Be equipped with an internal cam lock
      e. Be equipped with a tamper switch that shall be wired to the I/O for software alarm when the panel is opened.
      f. Shall have space for batteries to support the access control system.
   5. Equip with a backplate that shall support direct mounting of the security panels and power devices
   6. Equip with magnetic cable supports that attach to the backplate to support cables.
F. Security Enclosure shall be Altronix Trove series or equal.

2.07 POWER SUPPLIES AND POWER DISTRIBUTION
A. Power supplies and power equipment shall be provided that support the entire access control system, security panels/controllers, door locks and all other field equipment of the access control system.
B. All power supplies shall be connected to 120VAC power with a hardwired connection. Install cable and connect to power.
   1. Provide and install conduit, wiring and connections required for 120-volt power connectivity.
C. Power supply shall be mounted to the enclosure. Shall include:
   1. Shall provide power to the panels in the enclosure and field devices.
   2. Shall include multiple 12- or 24-volt outputs. Shall be settable on the panel
   3. Input voltage of 120VAC with a fuse
   4. Classified as a Power-Limited stand-alone power supply with stand-by battery and suitable to power sensors and electro-mechanical devices (e.g. electric door strikes), as defined in the National Electrical Code/NFPA70/NFPA72
   5. Shall be sized for outputs of 1 thru 16 unique outputs.
   6. Battery connection for charging on-board batteries.
   7. Fire alarm disconnect
      a. Shall support Normally Open or Normally Closed trigger
      b. Shall be set to latching or non-latching
   8. LED indicators for:
      a. AC input
      b. DC output
      c. Battery discharged or no battery
   9. Over Voltage protection
   10. Short Circuit protection
   11. Power supply shall be Altronix #eFlow series or equal.

a. Provide actual part that provides for all power and control of the system as required to meet the manufacturers requirements and these specifications.

12. Equip with an Ethernet Module for panel control and monitoring:
    a. Shall support remote supervision, control and monitoring over an Ethernet connection.
    b. Connect to the owner's network and setup monitoring.
    c. Altronix #Linq2 or equal

D. Access Power Controllers
1. The Power Controller shall have the following characteristics:
    a. Powered by 12 VDC or 24 VDC from the power supply/charger board or via 8-Pin connector to stack with Voltage Regulator for dual voltage (12VDC & 24VDC) outputs from a single 24VDC input, up to 6 Amps
    b. Spade lug connectors to facilitate the transfer or sharing of 12VDC and/or 24VDC power between Access Power Controllers or Power Distribution Modules
    c. 8 trigger inputs to correspond with similarly numbered triggered controlled outputs, with each trigger input being in one of the following forms:
        1) Normally open (NO) contact
        2) Open collector
    d. 8 independently trigger-controlled outputs with the following output options:
        1) Fail-Safe filtered and electronically regulated power outputs
        2) Fail-Secure filtered and electronically regulated power outputs
        3) Form "C" relay outputs, rated 5 amps @ 28 VDC/VAC.
        4) For each triggered output, LED indication of an active output.
        5) Bi-colored LEDs for visual verification of voltage (12VDC or 24VDC) per output
        6) An unswitched auxiliary power output, rated at 2.5 amps (fused) or 2 amps (PTC), used in lieu of a trigger-controlled output.
        7) Fuse protected
    e. FACP (Fire Alarm Control Panel) interface
        1) input options from the FACP:
            A) polarity reversal
            B) Normally Open - Non-Latching or Latching with reset
            C) Normally Closed - Non-Latching or Latching with reset
        2) Ability for the FACP to trigger any of the trigger-controlled outputs
        3) Trigger indications:
            A) LED indicator on the module
            B) Form "C" output relay contact rated 1 amp @ 24 VDC
    f. Current protection
        1) access control module: 10-amp fuse
        2) individual outputs: 2.5-amp Class 2 rated PTC device
2. Access power controller shall be Altronix #ACMS8 or equal.

E. Power Distribution board with voltage regulator.
1. The Power Distribution Module shall be a UL Listed Sub-Assembly board level product comprised of fused protected outputs to furnish 12 VDC, 24 VDC or 24 VAC power to surveillance, security, access control systems and components, and other security-related equipment.
2. Power distribution module shall include:

a. The Power Distribution Module shall employ a single distribution board.
b. The Power Distribution Module shall output 5VDC to 24VDC up to 10A each or 16VAC to 28VAC up to 14A each.
c. Fused protected outputs.
d. Individual voltage LEDs indicate 12VDC (Green) or 24VDC (Red and Green)

3. Modules shall provide for:
   a. Dual Power Supply Inputs.
   b. Outputs shall be switch selectable as to route power via Input 1 or Input 2.
   c. Shall be stacked with a voltage regulator and connected via eight (8) pin connector.
   d. Individual voltage LEDs indicate 12VDC (Green) or 24VDC (Red and Green).
   e. Eight (8) individually fused device protected outputs.
4. Power distribution board shall be Altronix #PDS8 or equal
   a. Equip with a voltage regulator Altronix #VR6 or equal.

F. Battery Backup
1. The enclosure shall have battery backup UPS circuit with built-in battery charger that shall provide automatic battery backup UPS power in event of AC line failure.
2. Each controller enclosure panel shall have a battery for power failure. Battery shall be fully enclosed in a metal cabinet.
3. The battery shall provide for full UPS operation for a minimum of 30 minutes

2.08 ACCESS CONTROL MODULE/CONTROLLER

A. The Contractor shall provide intelligent controller modules / cards for the security system that utilize a true distributed processing technology with local processing at each controller.
1. Shall provide for an open architecture or shall be from Continental Access to match system that is in use at the building.

B. One module per communications room or immediate adjacent enclosures shall provide for communications with the server/software via on-board 10BaseT/100BaseTX Ethernet port and support TLS encryption as a minimum-security implementation.

C. In the event system communications is lost or the server/cloud fails, all networked intelligent controller, (controllers or security panels or modules, terms will be used interchangeably) shall provide complete control, operation, and supervision of all monitoring and control points based on the latest database information.

D. The controller shall provide centralized biometric template management and support a wide range of reader technologies, including OSDP, Wiegand, magnetic stripe and biometric.
1. Control module shall support, as a minimum the following open standards:
   a. PSIA Area Control,
   b. SNMPv3/v2c,
   c. OSDP and OSDP SC.
2. The controller shall utilize a cryptographic module, like OpenSSL FIPS Object Module RE, that is validated to FIPS 140-2 thus providing a certified implementation of Transport Layer Security.
3. Security on the controller shall include:
   a. Host/Controller connection protected by TLS 1.2/1.1 or AES-256/128

b. Controller/IO Expansion connection protected by AES
c. Generate and load custom peer certificates for TLS
d. Port based network access control using 802.1X
e. Crypto memory chip
f. FIPS 140-2 user of OpenSSL
g. HTTPS protection for installer web pages
h. Secure cookies
i. SNMPv3/v2c
j. DIP switch toggle sets 5-minute time to disable webpage access
k. Disable default login credentials
l. Authorized IP address filtering
m. IP Client Proxy
n. Bulk erase controller and periphery devices during replacement
o. Strong password enforcement

4. Door Control on controller shall support:
5. One or two-reader ports: Clock and Data, Wiegand, or RS-485
   a. Eight programmable inputs, four relays, diagnostic LEDs
6. Access Control shall support:
   a. 240,000 Cardholder capacity
   b. 50,000 Transaction buffers
   c. If/Then Macro capability
   d. Adjustable cardholder capacity
   e. Supports up to 520 inputs and 516 outputs
7. Card Formats supported shall include:
   a. 16 card formats per active reader, 8 per offline reader
   b. Entire card number reported on invalid read
   c. 19-digit (64-bit) User ID and 15-digit PIN numbers maximum
   d. PIV, CAC, TWIC card compatible
   e. 255 Access Levels per card holder
   f. Activation/Deactivation Date or Date & Times
8. Card Reader Functions shall include:
   a. Multiple card format support by reader
   b. Paired reader support
   c. Alternate reader support
   d. Elevator support
   e. Turnstile support
   f. Biometric device support
   g. Open Supervised Device Protocol (OSDP) and OSDP SC compliant
   h. Occupancy count
   i. Support of multi-occupancy rules
   j. Anti-pass back support
   k. Area-based, reader-based, or time based
   l. Nested area, hard, soft, or timed forgiveness
   m. Supports host-based approval rules
   n. Keypad support with programmable user commands, card input
   o. Shunt relay support
   p. Strike follower relay support
   q. Threat level and Operating Modes
   r. Host controlled OSDP reader passthrough
   s. Elevator floor override

E. The controller shall be configured to avoid system failure. In the event of a server or system failure, transactions are to be stored at the controller until the server and connection is back online. Once it is online then the information shall be downloaded to the server.
   1. The controller shall be utilized as the “brains” of the security and access system. All door contacts, card readers, request to exit contacts, assisted openers, door controllers, electric latch devices, electric strikes and other devices shall connect to the controller.
      a. Controllers shall be microprocessor-based, multi-tasking, multi-user, and use real-time, digital control processors.
      b. Each control panel shall consist of modular hardware including power supply, CPU board, and various input/output modules.
      c. Memory at the controller shall be large enough to store 10,000 card holder information points.
      d. Controllers shall be able to be updated via remote connectivity or direct connectivity. Updates shall be for new firmware or software updates.
   2. Controller shall be fully configurable by the Owner via a Microsoft Windows type interface through the operator workstation or through offsite connectivity through the IP network.
   3. Controllers shall mount in enclosure on the wall where noted on the drawings.
   4. Provide the quantity of controllers required for all electronic door locks, card readers and all other devices noted on the drawings and specifications.
      a. Each controller shall have onboard LEDs for self-diagnosis.
   5. Each controller shall support IP communications. Additional communications shall be via RS-232 and or RS-485.
   6. Shall include a real-time on-board clock synchronized with Server.
   7. Where the door hardware installer provides a door interface or door controller card that works with the electric latch/strike and request to exit button, the communications contractor shall provide the correct interface to read data and send data to the door controller.
   8. The link to other systems shall take place at the controller as well as through the I/O boards so that in the event of failure or an alarm. the rest of the system shall continue to function correctly.
   9. The maximum time for door opening from the proper presentation of a card shall be less than one second.
   10. ADA assisted Openers
      a. Controller shall interface with ADA openers and ADA door buttons.
      b. At some doors, there are assisted openers. At these doors, the controller shall completely work with the opener. Include equipment and programming to allow the doors to function as per below:
         1) When approaching from the exterior and doors are locked:
            A) Present a card and then door shall be unlocked. Push the auto opener and the door shall open.
         2) When approaching from the exterior and doors are unlocked:
            A) Push the auto opener button and the door opens.
         3) When approaching from the interior and doors are locked:
            A) Push the auto opener button and the door shall unlock and open.
         4) When approaching from the interior and doors are unlocked:
            A) Push the button and the door opens.

11. Controller shall connect to the fire alarm system. In an alarm condition, the controller shall unlock doors as required to allow people to enter and exit the building. The Contractor shall provide all cabling, software and hardware required to interface with the fire alarm system as well as the video security system.
12. Controller with Ethernet connectivity shall be Mercury LP Series or equal
13. Controller with RS-485 connectivity shall be Mercury MR Series or equal

F. I/O Cards/Modules shall be installed in the enclosures and attached to the controller to allow input and output to the field devices throughout the building(s).
1. Provide additional modules or boards to support all control, access and security points shown on the drawings and described in the specifications.
   a. I/O boards shall pop in and pop out. Replacing a board for a certain point shall not require shutting the entire controller down.
2. Modules shall be installed to connect to the field devices, including but not limited to:
   a. Door contacts,
   b. Request to exit devices,
   c. Push buttons/Panic buttons
   d. Toggle Switches
   e. Assisted door opener devices and door opener buttons
   f. Motion sensors.
   g. Strobe lights
   h. Embarrassment alarms / exit alarms
   i. Lockdown buttons with Lockdown Status Light
   j. Other field devices noted
   k. All other security devices required and shown on the drawings.
3. Modules shall translate information from the field devices to the controller and thus the server for records and access control.
4. I/O Card shall be provided that serve access control devices such as door contacts and garage contacts. These cards shall provide alarms when the contact is “open”. The time before alarm shall be fully configurable by the owner.
5. Output types shall be digital/analog for control of doors. In addition to the door output, the control module shall contain auxiliary outputs for ON/OFF control of other devices.
6. Shall provide inputs and outputs to monitor and control non-reader-based system points, such as door contacts, motion sensors, gate actuators, ADA Buttons and ADA openers etc.

2.09 CREDENTIALS

A. All credentials are existing

2.10 DOOR LOCKING DEVICES

A. Latch Retraction device: “LR” on drawings
1. The door hardware installer will install a Latch Retraction device as shown on the drawings.
2. Provide and install a power supply in the communications room to power the LR device. Review the door hardware and match the power supply to the Latching Retraction devices. Provide quantity as required to power all LR devices

3. The security contractor shall wire from the LR device to a power supply in the communications room and then to the controller panel in the communications room.
4. Provide cards in the controller panel and equipment to allow the security system to interface with the LR.
5. The LR shall be able to be held open based upon a time schedule put forth in the security system. It shall also be able to be retracted upon presentation of a valid card or fob to the card reader.
6. See door hardware specifications for transfer hinge and wiring harness provision plans.
    a. If wiring harness is provided as part of door hardware:
        1) Wire from door harness, through raceway and back to the power supply in the comm room. Wire to security panel for control of the door.
        2) Provide custom wiring and connectors to connect to the wiring harness
    b. If no wiring harness is provided as part of the door hardware.
        1) Wire from the LR, through the hinge and back to the Power Supply in the comm room. Wire to security panel for control of the door.
    c. Provide manufacturers recommended cabling type and wire gauge.

2.11 READER DEVICES

A. Card Readers: “CR” on drawings
1. Refer to the drawings for locations where card readers “CR” are required.
2. Card readers shall be combo readers that read standard 125 khz readers for standard prox and 13.56 MHz “smart” cards and 2.4Ghz (Bluetooth) compatibility.
3. Card readers shall be completely compatible with the security/access system.
4. Card readers shall be mountable in a single gang box or in the frame of a door. Refer to drawings for locations.
5. Readers shall be sealed to allow outdoor installation.
6. Power requirements for the card shall be between 12 volts DC.
7. Reader must be capable of providing a read range up to 4” for proximity cards without modification.
8. Mobile credential range shall be
9. Reader shall operate in a temperature range of minus -31°F to 150°F.
10. Reader shall be designed for both surface mounting and mounting on a single-gang electrical box.
11. Reader shall have a tri-color light emitting diode (LED. and audible tone for noting of accepted read or rejected card read.
12. Reader shall flash the LED green momentarily and emit a short beep to indicate that a card was read.
13. Shall communicate via Wiegand or RS-485
14. Card readers on single-gang boxes shall be HID Signo #40 or equal.
15. Card readers on the frame of a door shall be HID Signo #20 or equal.
16. Card readers on the intercom shall be HID MultiClass SE #RP10 or equal.
17. Keypad Reader.”KR: on drawings
    a. Card readers with numeric keypad, on a single-gang backbox shall be HID Signo #20K or equal

2.12 DEVICES AT THE DOOR

A. Door Contacts; “DC” on drawings

1. Contractor shall install magnetic door contacts in the top of each door required to be monitored. See drawings for door contact “DC” locations.
2. Install industry standard magnetic door contacts into the top of the door and the matching contact into the header of the door.
3. Contacts shall be compatible with the security/access system provided. Each contact point shall be defined in the software and shall be given an alphanumeric designation.
4. Contacts shall connect back to the controller via wire installed by the Contractor.
5. In locations where there are double doors, two contacts shall be installed, and the connections shall be made so that the opening of each door is detected.
6. When the contact is installed in the recessed part of a metal doorframe, an appropriate, solidly attached metal support shall be used. The tolerance “gap” shall be adjusted to the frame and the door.
7. Wire door contacts back directly to an I/O card in the controller panel. DCs shall not be wired through Request to Exit devices.
8. Door contacts shall be 1” diameter.
9. Door Contacts shall be GRI 184/12 or equal

2.13 AUTO OPERATOR DOOR INTERFACES

A. Assisted Opener “AO” on drawings
   1. The contractor shall wire to the assisted door openers where shown on the drawings.
   2. The wiring shall allow integration of the working of the door locks, card readers and the push to open buttons.
   3. The work shall include wiring and integration at the doors and at the controller panel to allow the Assisted Openers to work as required by the owner. See specs and drawings for additional information.

B. Assisted Opener Buttons. “AB” on drawings
   1. Assisted opener button is provided by others.
   2. Wire from the “AB” devices inside the vestibule and inside the building to unlock the door and then trigger the door to open when exiting the building.
   3. Provide all cabling to connect the AB devices to the access control system.
   4. Configure the security system to unlock doors as people exit the building and push the opener buttons to exit.

2.14 WIRES AND CABLES

A. The contractor shall be responsible for supplying and installing all cabling to make the system operational.
   1. Size conductors as required to transmit all power and signal to all devices.
   2. All cabling shall be Plenum rated
   3. All cabling shall be installed in raceways and in accessible ceiling spaces through cable supports.
   4. Provide manufacturer specified cabling based on use and length of signal transmission from panel to device.
   5. Generate drawings showing the cables required and get those reviewed by the designer prior to installation.
   6. All cabling shall be labeled at each end with laser printed wrap-around labels

B. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape

shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

C. Plenum Rated, PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.

D. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.
1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

E. Multi-conductor, Readers and Wiegand Keypads Cables: No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
1. NFPA 70, Type CMG.
2. Flame Resistance: UL 1581 Vertical Tray.
3. For TIA/EIA-RS-232 applications.

F. Paired Readers and Wiegand Keypads Cables: Paired, 3 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
1. NFPA 70, Type CM.
2. Flame Resistance: UL 1581 Vertical Tray.

G. Paired Readers and Wiegand Keypads Cable: Paired, 3 pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
1. NFPA 70, Type CM.
2. Flame Resistance: UL 1581 Vertical Tray.

H. Plenum-Type, Paired, Readers and Wiegand Keypads Cable: Paired, 3 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum foil-polypropylene tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

I. Plenum-Type, Multiconductor, Readers and Keypads Cable: 6 conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
1. NFPA 70, Type CMP.
2. Flame Resistance: NFPA 262 Flame Test.

J. Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
1. NFPA 70, Type CMG.
2. Flame Resistance: UL 1581 Vertical Tray.

K. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

L. Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMG.
   2. Flame Resistance: UL 1581 Vertical Tray.

M. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

N. Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum foil-polyester tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
   1. NFPA 70, Type CMR.
   2. Flame Resistance: UL 1666 Riser Flame Test.

O. Plenum-Type, Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, aluminum foil-polyester tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

P. Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
   1. NFPA 70, Type CMG.

Q. Plenum-Type, Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
   1. NFPA 70, Type CMP.
   2. Flame Resistance: NFPA 262 Flame Test.

R. Elevator Travel Cable: Steel center core, with shielded, twisted pairs, No. 20 AWG conductor size.
   1. Steel Center Core Support: Preformed, flexible, low-torsion, zinc-coated, steel wire rope; insulated with 60 deg C flame-resistant PVC and covered with a nylon or cotton braid.
      Shielded Pairs: Insulated copper conductors; color-coded, insulated with 60 deg C flame-resistant PVC; each pair shielded with bare copper braid for 85 percent coverage.
      a. Jute Filler: Electrical grade, dry.
      b. Binder: Helically wound synthetic fiber.
      c. Braid: Rayon or cotton braid applied with 95 percent coverage.
      d. Jacket: 60 deg C PVC specifically compounded for flexibility and abrasion resistance. UL VW-1 and CSA FT1 flame rated.

PART 3 - EXECUTION

3.01 EXAMINATION

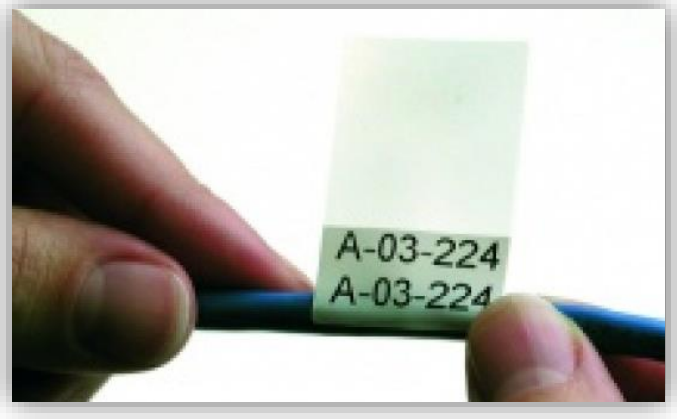
A. Examine all pathways prior to installation of all cables and raceways.

3.02 PREPARATION

A. Locate main path for all cables and install J-hooks where cable tray is not provided.
B. Coordinate with other trades to install a clear, straight path down major corridors for the routing of security/access cables back to the communications closet.
C. Plan installation of cables along wallfield in communications room. Provide finger-duct and D-rings for support of cables. See drawings

3.03 INSTALLATION-GENERAL

A. Security/access cable shall be installed per industry standards.
   1. Install all cabling required for complete system connectivity. Cabling shall be plenum rated.
   2. Care shall be taken to avoid crimping or bending the cable past the manufacturer's recommended bend radius.
   3. During installation, the cables shall not be pulled across the ceiling tiles or the structure of the building. This may cause damage to the cable jacket.
   4. Adhere to all pulling tensions and bend radii during installation.
   5. All cables shall route neatly in the ceiling. Whether they route in cable tray or J-hooks, the cables shall be neat and orderly.
   6. Support cables at a minimum of every 5 feet.
   7. When routing security/access cables parallel to electrical conduits and lighting ballasts, the cable shall maintain a clearance of at least 12 inches. When running perpendicular to electrical conduits and lighting ballasts the cable shall maintain 6 inches of clearance.
   8. Provide a short coil of extra cable where the cable enters the vertical conduit. The coil shall consist of no less than 1-1/2 feet.
   9. When installing cables in the communications room, all cable shall route neatly through the cable tray and cable ladder.
   10. Provide a service loop of the cables on the wallfield.
   11. Each cable shall have a self-adhesive, self-laminating, laser printed label at each end. The label shall show the location identifier of that cable. Labels shall be installed no more than 4 inches from the termination point of the cable.



   12.
B. Firestopping is required at all riser conduits, and all pass thru's.

1. Each cable tray penetration of a wall shall be firestopped after cable installation. Use pillow type firestop to allow additional cables to be installed in the future.
2. Where riser conduits pass through floors, the area between the concrete and the conduit shall be firestopped. This shall be completed with a putty or liquid firestop product. Fill in the space with mineral wool, and then install the firestop on top. All firestop shall be of sufficient thickness to secure the rating required by code.
3. After final cable installation, install a putty firestop around all cables where they enter and exit conduit pass thru's and conduit risers.
4. Firestop as per AHJ requirements.

C. Cabling at the Panel.
1. Contractor shall coil all spare cable from the door devices outside the security panel and shall neatly coil the cable on the wall. Provide 5' minimum in the coil for future movement of the panel.
2. Cables shall route into the panels through a grommeted hole that is sized for the cables entering.
3. All cables shall be installed in a neat and workmanlike manner.
4. Cables shall be terminated and shall allow for removal of a card without un-terminating the cables.
5. All cables shall be neatly distributed to the card in the panel.
6. All labels shall be visible inside the panel near the termination point. Label cables equidistant from their termination point.

D. Proper support of cables is of paramount importance when installing a cable infrastructure. All cables not in conduit or cable tray shall be supported via J-hooks a minimum of every 5 feet.
1. Routes of cables shall be parallel or perpendicular to the walls of the building.
2. Install the J-hooks to minimize changes in the level of the cables as they route through the J-hooks.
3. All communications shall route as high in the ceiling as possible while still being accessible and staying away from other utilities.
4. When installing the cable through the J-hooks, they shall all have relatively the same droop between hooks. All cables shall be installed neatly and squarely.
5. Secure the J-hooks to the building structure with beam clamps and threaded rod as required to support the cables.
6. J-hooks shall never be attached to drop ceiling support wires. Cables shall never be supported by drop ceiling wires.

3.04 SERVER AND SOFTWARE INSTALLATION

A. Management Server:
1. Existing at the Data Center

B. Control Software:
1. Contractor shall provide all software required for a fully functional security/access system.
2. Software shall be installed and fully configured by the Contractor.
3. Contractor shall schedule meetings with the Owner prior to installation to determine the working of the security/access system.
4. Install control software on the management PC in the communications room.
5. Install software or browser-based links on up to 2 other PCs attached to the IP network to allow remote monitoring and control of the entire security/access system. Work with Owner on determining location of PC's.

6. Configuration of the security software shall include but not be limited to the following:
    a. All users are already in the system
    b. Number each door and any input and outputs associated with that door and associate it with a standard door name for easy review.
    c. Meet with the owner to determine how they will use the system. Take information from them that will allow all custom settings of the software system. This shall include but not be limited to:
        1) User groups based on building and administrative group
        2) Access levels based on groups and times.
        3) Door Groups for access and locking and unlocking schedules.
        4) Building locking and unlocking schedules for each building
        5) Administrative levels and super administrators
        6) Building arming and disarming schedules of door contacts
        7) Alarm level setting for different doors based on time of day and day of week.
        8) Lockdown and Normal locking schedules. Configure the system to lock all doors upon going into lockdown mode through the button or through the software system.
        9) Snow-Day override schedule that shall change when doors unlock and lock and which users or user groups are allowed to access the building during a snow day. Snow day shall revert back to regular scheduling afer 11 PM that day.
        10) Setup all user logins to allow specific viewing of portions of the system based on login ID.
            A) Detail in the setup that person's rights in working in the system.
    d. Lockdowns and Secure
        1) Create different locking schedules and processes for Lockdowns and Secure situations.
        2) Work with the owner to determine what doors are locked or unlocked in a lockdown or secure situation.
        3) Make all settings and groups required for each situation.
    e. Set all alarm levels and outgoing calling attributes such as central station outcalls, paging and email alerts.
        1) Add users and all those that are to be notified on a building basis.
        2) Set levels for all door contacts such that the owner is notified of a door open when the system is armed but is not alerted during the day unless they ask for this type of configuration.
    f. Generate customized maps for each building.
        1) Create maps from the owner that have multiple levels such as entire building and then subdivided into different areas.
        2) The maps shall show icons for each door. The icons shall be green or red based on open or closed door.
        3) Setup all icons to allow the owner to click on a door and then have direct access to lock or unlock or pulse the lock on a door.

3.05 CONTROL PANEL INSTALLATION

A. Enclosure and power
    1. Contractor shall mount the enclosure on top of ¾" fireproof plywood.

2. Mount enclosure in the location noted. Coordinate other equipment and wallfield systems.
3. Locate the 120-volt power outlet and install enclosure in relation to power
4. Size the enclosure to support all PACS devices noted on the drawings and in the specifications.
5. Provide magnetic cable support devices in the panel to route cables inside the panel to the controllers and power devices
6. Power.
    a. Install cabling and raceway to connect the power supply in the enclosure to the 120-volt power outlet.
    b. Shall be hard-wired power. Plug-in power is not allowed
    c. Provide an electrician for connection of the power supplies if required by AHJ.
7. Battery backup
    a. Provide and connect the batteries to the power supply for the enclosure
    b. Test the battery supports the panel by removing 120-volt power after the system is fully up and operational.
8. Network connectivity
    a. Provide and install CAT-6 cable from the enclosure for the power supply to the communications rack. Connect to the Ethernet switch
9. Other Controllers and I/O Board connectivity.
    a. Provide and install cabling to connect the Ethernet controller to the other controllers and I/O boards via RS-485.
    b. Do not install RS-485 between communications rooms. Each comm room shall have an Ethernet attached Controller.

B. Controller:
1. Controller(s). shall be mounted in the enclosure as shown on the drawings.
2. Controller shall be sized for all security, access, control, and monitoring points existing on the drawings and shall be expandable.
3. Controller shall be able to be linked to additional controllers in other communications rooms/buildings via the Ethernet network.
4. Each port in the controller that is connected to a security point shall be labeled inside the controller box.
5. Label the outside of the panel with the door numbers and list of devices that are connected in that panel. Shall be laser printed adhesive labels.
6. Label the inside of the panel door with the layout of the panel and which controllers attach to which devices. Include door numbers on the diagram.
7. Depending on the type of panel the contractor shall provide cable routing hardware and equipment to neatly install cabling.
    a. Route cable to allow easy change and replacement of the individual control cards in the panel.
    b. Cabling shall be neatly bundled. See example below of adequate cabling being routed into a panel.
8. Network connectivity
    a. Provide and install CAT-6 cable from the controller to the communications rack. Connect to the Ethernet switch
    b. Connect on the Ethernet to the Switch.
9. Panel and cable installation



a.
b. Typical routing and cable organization in an access control panel.
c. Route all cables along a central path.
d. Label the cables as they enter the panel for the door to which they connect.
e. Support cables along the backplate
f. Label all interconnection cables with wrap-around labels that detail what they connect to.

3.06 DOOR LOCKING CONNECTIVITY

A. Latch Retraction device. “LR” on drawings
1. The Latch Retraction devices shall be provided by the door hardware supplier.
2. Power supplies shall be located in the comm room. Provide and install power supplies. Connect power supplies to the controller panel.
3. Install all cables required to be connect this power supply to the security system and to the actual Latch Retraction lock at the door.
4. Review door hardware specifications to determine if a wiring harness is being provide by the door hardware supplier.
a. Install cables from the controller panel and power supply to the wiring harness. Connect to harness
b. Install harness from door hardware LR to the hinge, through the hinge and to the connection point above the door.
c. Wire from connection point above door to the power supply and then to the security panel.
d. If no harness is provided, then wire from LR device, thru the hinge, to the power supply controller and finally to the security panel.

3.07 READER INSTALLATION

A. Card Readers “CR” on drawings

1. Card readers shall be installed at locations shown on the drawings.
2. Review site and drawings and coordinate the wall mounted readers and frame mounted readers. Order the correct reader for each location.
    a. Conduct a site visit prior to ordering card readers.
    b. If the wrong reader is ordered, then the contractor shall provide the correct reader.
3. Coordinate installation of all card readers with the doors and walls.
4. Where the reader is mounted on the door, coordinate the installation with the installation of the door to allow all cable for security/access.
5. Locate all card readers at ADA compliant heights and locations.
6. Wire and configure the card readers so that when the lock is engaged the light on the reader is red and when the door is unlocked the light is green.
7. Garage Doors and Pedestals: At the garage doors and at pedestals the card readers shall be installed with a box that has a cover for the top of the card reader.

3.08 DEVICES AT THE DOOR

A. Door Contacts “DC”

1. Install contacts where shown on the drawings. For door contacts, install them at the top of the door.
2. Work with door provider and installer on timing of door contact installation.
3. Install raceways to allow installation of the door contacts if no raceway is provided inside the wall.
4. Drill into the door frame and door to allow installation of the door contact and the associated cable. No cable shall be visible after installation.
5. Where door frames are filled, they shall be drilled out to allow installation of the door contact. Surface mount contacts are not allowed unless specifically noted on the drawings.

3.09 ASSISTED OPENER FOR ADA

A. Assisted Opener: “AO” and assisted button “AB” on drawings

1. Where an assisted opener is shown, the contractor shall wire to this opener to work as noted on the drawings and as below:
2. Operation sequence when the doors are locked entering from outside -valid id card
    a. If the person presents a valid card, then the latch shall retract inside the exterior door.
    b. The door shall hold unlocked for 15 seconds.
    c. The control board shall allow the exterior push button to be energized. Once the push button is energized then the exterior door shall be opened if the button is pushed.
3. Operation sequence when the doors are unlocked entering from outside
    a. Push the ADA button Exterior door opens
4. Operation sequence when the doors are locked entering from outside -no card or invalid card
    a. If the person pushes the exterior opener button, then the auto opener shall not engage because the opener button is not energized.
    b. The exterior opener button is not energized unless the PACS notes that the door is unlocked.
5. Operation sequence when the doors are locked, exiting from interior

a. When a person pushes the interior opener button then that shall communicate with the interior auto opener and open that door.
b. The control board of the auto opener shall communicate with the access control system and instruct it to retract the latch on the interior door.

6. Operation sequence when the doors are locked, exiting from vestibule
   a. When a person pushes the vestibule opener button then that shall communicate with the exterior auto opener and open that door.
   b. The control board of the exterior auto opener shall communicate with the access control system and instruct it to retract the latch on the exterior door.

END OF SECTION 283500

SECTION 283600 – SECURITY RECORDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes parts and equipment required for installation and configuration of a video security system. This system shall be referred to as the “security system” throughout these specifications.

1.02 SYSTEM DESCRIPTION

A. The district uses the Milestone VMS.
B. This is existing at the Lansing Data Center
C. Servers are existing.
D. Provide additional licensing and cameras and connect to the network and VMS

1.03 COORDINATION

A. Coordinate with the network contractor. Provide IP addresses and ports the cameras are connected to in an excel spreadsheet to the network contractor for VLAN configuration
B. Coordinate with data cabling contractor. Walk the site and identify all camera locations and make the cabling contractor aware of all camera locations.

1.04 PROJECT PLAN

A. The contractor shall provide a project plan to the owner and contractor that describes the system and its capabilities and the possible configurations.
B. Provide a project approach which describes the installation and implementation plan and schedule and all sequencing.
C. Meet with the owner numerous times to determine how the system should work and how it should be monitored. Configure the system prior to installation to meet these requirements. Demonstrate the system use to the owner prior to installation and obtain approval to move forward with the installation.
D. Provide shop drawings showing all configuration and connectivity of the system.
E. Generate a testing plan and have that plan approved by the owner and engineer prior to installing the system.

1.05 RELATED STANDARDS

A. The security system shall conform to the following international and national standards:
    1. FCC Rules and Regulations
    2. UL 294 Access Control Systems
    3. UL 1076 Line Supervision
    4. 21 CFR part 11
    5. Part 15, Radio Frequency Devices
    6. National Electrical Manufacturers Association (NEMA)
    7. Applicable Federal, State and Local laws, regulations, codes
    8. Americans with Disabilities Act (ADA)

9. National Electrical Code (NEC)

PART 2 - PRODUCTS

2.01 MANUFACTURERS
- A. Approved vendor for video security camera recording software is:
  1. Milestone
  2. No others are allowed

2.02 VIDEO SECURITY HARDWARE
- A. Network Video Recorder (NVR):
- B. This is existing at the Data Center

2.03 VIDEO MANAGEMENT SOFTWARE (VMS)
- A. The VMS shall be Milestone
- B. Provide additional licensing for cameras that are installed as part of this project

PART 3 - EXECUTION

3.01 EXAMINATION
- A. Review site and note locations of cameras, conduits and cables prior to installation.
- B. Review all ceiling styles on the reflected ceiling plans. Provide mounts as required based on the ceiling style.

3.02 INSTALLATION
- A. Fully configure the Video Recording and Control Software.
  1. The Contractor shall meet with the Owner prior to installation of the system to discuss all aspects and abilities of the NVR and VMS and the attached cameras.
  2. The Contractor shall present all configuration options to the Owner to get their input and let them choose how the system is to be used and configured.
  3. The Contractor shall take information from the meeting and record that in meeting minutes. Provide copies of these minutes to the Owner and Designer
  4. The Contractor shall configure and install the system as requested by the Owner and as shown on the drawings and specifications.
  5. Configuration of the system shall include but not be limited to the following.
     a. Labeling of all cameras in the system to match the owner approved labeling scheme as well as their chosen specific descriptive name.
     b. Video blanking of any areas on each camera if there are areas that are not to be seen or recorded by the NVR system.
     c. Passwords and logins for users and administrators. Include in this a list of all the users and their access levels.
     d. Recording Frames per second, resolution and long term recording resolution.
     e. Generation and configuration of any presets for PTZ cameras including tours and timing.
     f. Specialized recording times for each camera including additional FPS or resolution at times of the day.
     g. Aiming, focusing and framing of all camera images.
        A) Sit with the owner and review each camera’s view and custom set the aiming, framing and focus of each camera.

B) Have someone at the camera while reviewing that is able to move and aim and focus the camera.
C) Download an image from the camera as the owner wishes it to be aimed
D) Create a spreadsheet with each camera and have the owner sign off on the aiming of each camera.

h. Generation of custom views for all user software. Meet with each person that is allowed to view the cameras and help them generate a custom view of the cameras they wish to see.

6. Contractor shall fully load and match all maps to the video security system. Install all maps and load all camera locations and hot buttons to the maps to allow quick connect to the cameras based on clicking on the camera location on the map.
   a. Each camera button shall show the camera number.
7. Recorded images and offloaded images shall be able to be time-stamped with the date, camera number and exact time down to the second when the video was recorded.
   a. This shall be able to be seen on the viewing station and shall be attached to the video when it is offloaded and viewed on an outside player.
   b. Setup the server and software to obtain time from the national standard time.

END OF SECTION 283600

SECTION 283700 – SECURITY CAMERAS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes parts, cameras and equipment required for installation of the video surveillance cameras.

B. This shall include new IP video cameras and their software/configuration equipment as shown on the drawings and detailed in the specifications.

1.02 COORDINATION

A. All cables shall be coordinated with the installation of the raceways.

B. All cameras shall be installed in the ceilings in relation to the lights and other obstructions.

1.03 DESCRIPTON

A. Provide new IP cameras for video surveillance. See the detailed security drawings for location and quantities.

B. Cameras shall be pure IP cameras without the use of external encoders/decoders where possible.

C. Power for interior and exterior cameras shall be provided via the POE switch or via a centralized power supply in the communications room.

1. The switches installed provide standard Type 3 PoE (15.4 watts) on each port. If a camera requires additional power above Type 3 PoE then the contractor shall provide that power supply and any additional required power cables.

D. PTZ cameras that require additional power above that provided from a Type 3 PoE connections shall be provided with a power supply.

1. Provide any and all camera, power and control cables required for complete system connectivity and functionality.

E. It shall be the Contractor’s responsibility to provide all power to cameras based on the above methods. Take into account the Manufacturers recommendations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved Manufacturers for IP cameras:

1. Axis
2. No others are allowed.

2.02 CAMERAS GENERAL REQUIREMENTS

A. Cameras shall provide full color images, and some shall change to black and white in low light.

B. Cameras shall support text overlay of image in viewing to allow naming/numbering of each camera on the screen and when video is offloaded.

C. The Contractor shall review the site with the Owner prior to ordering the lens for each camera.
   1. Finalize the needs of the Owner with the camera position to ensure that the correct lens is purchased for the camera.
D. Where noted on the drawings, provide a vandal resistant dome to the camera.
E. Where cameras require more power than PoE 802.af then the contractor shall provide power to the camera from a centralized power supply in the comm. room.
F. External Cameras
   1. Each exterior camera shall be equipped with a heater/blower or other device to keep camera functional and keep lens/casing from fogging or condensation from forming.
   2. Provide mounts for exterior cameras based on their installation location. Provide fully enclosed mounts. See drawings and conduct a field survey prior to ordering to ensure that he correct mounts are provided.
      a. Exterior mounts shall allow cable entry to the dome via the support. No cables shall be exterior to the mount or dome.

2.03 CAMERAS -1080P RESOLUTION OR BETTER
A. Interior/exterior fixed IP dome camera: 1920X1080 Resolution (2 Megapixel). Color/Black and White
   1. Camera shall be capable of the following:
      a. Plenum-rated backbox for indoor installations
      b. Adjustable fixed camera mounting bracket that allows 360-degree mounting.
      c. Dome shall be clear exterior, smoked on interior cameras
      d. Power through PoE 802.af
      e. Network interface via an 8-pin RJ-45 connector.
      f. Compatible with the Video Recording System
      g. Minimum frame rate capability shall be 25 frames per second at maximum camera resolution. 30 FPS at all other camera resolutions.
      h. Outdoor version shall be -40F to 149F
   2. Compression shall be H.264, H.265 or Motion JPEG.
   3. Camera/lens shall meet or exceed the following requirements:
      a. 1 /2.8 inch progressive Scan RGB CMOS.
      b. Picture element that is 1920 (H). x 1080 (V)
      c. Remote electronic varifocal lens with Remote zoom and focus
      d. Auto Iris
      e. Wide dynamic range
      f. Light sensitivity of .1 lux for Color, .02 lux for black and white. Lens shall automatically flip based on light input.
      g. Horizontal field of view of 100 deg. To 36 deg.
   4. Interior Fixed IP day/night Dome Camera shall be Axis #P3265-V or equal.

2.04 CAMERAS 360/270 DEGREE VIEW-MULTIPLE SENSOR
A. Outdoor, multi-sensor fixed IP dome camera with configurable coverage:
   1. Combined resolution of 8 MP. Qty of four, (4) 1920x1080 sensors. Color camera
   2. Camera shall be capable of the following:
      a. Wall, pole or corner mount.
      b. Adjustable fixed camera mounting bracket that allows 360-degree mounting.
      c. Dome shall be clear.

d. Power through PoE 802.af
e. Network interface via an 8-pin RJ-45 connector.
f. Compatible with the Video Recording System
g. Minimum frame rate capability shall be 12 frames per second at all camera resolutions
h. Multiple windows for images. Images shall be de-warped in each window.
i. Settings for 360-degree view or 270-degree view with downward pointing fourth imager
j. Outdoor Rated: -30 °C to 50 °C (-22 °F to 122 °F)

3. Compression shall be H.264
4. Camera/lens shall meet or exceed the following requirements:
   a. Picture element Qty of four, (4) 1920x1080 sensors
   b. Light sensitivity of .17 lux for Color, 0 lux for Black/white
   c. Included IR blaster
   d. UL listed.
5. Interior/Exterior Fixed IP day/night Dome 360/270-degree Camera shall be Axis #P3727-PLE or equal.

2.05 CAMERA ACCESSORIES

A. Camera Mounts:
   1. The Contractor shall provide all appropriate camera mounts. Refer to the drawings and conduct a site survey to determine each camera mounting type required.
      a. Complete this prior to ordering cameras.
      b. Review Reflected ceiling drawings from architect.
   2. Exterior cameras will be mounted to the wall of the building in most cases.
      a. Where the camera is to look along the wall of a building the contractor shall provide a pendant mount that mounts the camera parallel to the ground.
      b. Mount shall extend the camera out from the building a few inches to allow viewing in 360 horizontal degrees
   3. The security cameras shall be mounted to building structure where shown on the drawings.
      a. Contractor shall provide a mount that best corresponds to the structure and can be securely mounted.
      b. Mount the camera at a height as shown on the drawings or at the optimum height to allow the best field of view and future service via extension ladder.
         1) Unless specified the cameras on the exterior of a building should not be installed more than 15’ above grade.
      c. When mounting the cameras, take into account the light and mount the camera so that it does not block light.
      d. The camera mount shall provide a route for cables extending from the raceway to the camera. Cables shall not be installed outside the camera dome or camera mount.
      e. The Contractor shall install a conduit to allow cable installation to the camera.
         1) This shall include installing conduits from the inside of the building to the outside of the building to support exterior cameras.

2) Core through the outside of the building. Coordinate location with owner and architect prior to drilling.
3) Install ¾ conduit or sized as per the mount.
4) Except for corner and parapet mounts no conduits shall be visible after installation.
5) At no time shall a cable be visible. Install flexible conduit and seal appropriately around holes made in the building
6) Repair wall after installation.
7) No cable shall be visible after camera installation.

4. Dome-type cameras interior to a building may be installed in the lay-in ceiling.
   a. Provide supports so that the camera's weight is supported from the "T" bars of the drop ceiling.
   b. Provide a backbox and escutcheon to make a tight fit from the dome to the drop ceiling tile.
   c. Locate the cameras to cover the area required by the Owner. Work with the Owner prior to installation.
5. Dome-type cameras interior to a building may be installed as a pendant mount from the building structure.
   a. Provide a backbox at the building structure. Install a down pipe and camera mount to attach the camera to the downpipe. Size the pipe as required.
   b. The camera mount shall keep the camera level and shall extend down to a level of no more than 11' AFF.
   c. Locate the cameras to cover the area required by the Owner. Work with the Owner prior to installation.
6. Dome-type cameras interior to the building may be required to be mounted to a wall.
   a. Where there is a wall mount requirement, the Contractor shall install a wall-mount. Ensure that it is securely mounted.
   b. Route the cable through the wall and through the mount to connect to the camera.

B. Camera and Power Cable:
1. Cables for transmission of the image and to provide power to the camera shall be plenum-rated.
2. Power cable (if required) shall be sized based upon the power requirements of the camera and other components in the camera, such as PTZ motors and heater.
3. See the drawings for the contractor responsible for installing CAT-6 cabling from the comm room to the camera.
4. The Security contractor shall install all patch cables between the termination of the user CAT-6 cable and the camera as well as the patch cable from the patch panel to the Ethernet switch in the comm. room.
5. All cables shall be supported in the ceiling a minimum of every 5 feet. Support can be provided by installing cable inside cable tray or conduit, or by installing J-hooks every 5 feet.
   a. J-hooks shall provide a smooth steel support for cables as they route through the ceiling.
   b. Each hook shall have a galvanized finish.
   c. Steel, UL listed, ultimate static load limit 50 pounds, rated to support Category-3 and higher cables, and optical fiber cables.

C. Power Supplies:

1. For interior PTZ cameras and external cameras (where PoE Power is insufficient) the power supply shall be centrally located in a communications room.
2. Provide all power supplies and cabling for connection to the electrical circuit.

2.06 CAMERA INSTALLATION ACCESSORIES

A. Firestopping shall be completed inside and around all conduits after cable installation. Contractor shall install the best firestop for each individual installation.
   1. Firestop shall be installed with regard to local and national building codes.
   2. The firestop shall be a putty-like substance that expands under heat and will not allow flame to pass for a designated period of time.
   3. Firestop shall conform to all NEC, NFPA, and UL requirements.
   4. Some wall pass-thru's are shown on the drawings. The Contractor shall utilize these where possible.
   5. Where the contractor must install cables through a wall where there is no pass-thru already provided, the Contractor shall be responsible for installing a fire-rated pass-thru and fire-stopping the conduit after cable installation.

B. Weatherproofing shall be completed inside and around all conduits supporting exterior cameras after cable installation. Contractor shall install the best weatherproof for each individual installation.
   1. Weatherproof around all conduits that extend through the building to the cameras on the exterior wall or soffit.
   2. Seal all cameras so that all camera housing does not allow water into the conduit or into the building.
   3. Seal so there is no infiltration of water or condensate.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine all pathways prior to installation of all cables.
B. Identify locations of all user conduits and backboxes prior to cable installation.
C. Review site and note locations of cameras and conduits prior to installation.

3.02 PREPARATION

A. Visit each camera installation location to verify the type of mount prior to ordering the cameras.
B. If another contractor is installing the CAT-6 cabling, then the contractor shall coordinate cable location with that contractor.
C. Green Tape walk thru.
   1. Contractor shall walk the entire site with the owner and identify each camera location with the owner prior to installation.
   2. Discuss the type of camera and its proposed field of view.
   3. Make adjustments as required by the owner and by the building structure to minimize interference and blocking of the camera image.
   4. Install a piece of green tape on the wall or ceiling at each camera location after agreement on the location is reached.
   5. Remove green tape after installation of cameras
D. Camera naming spreadsheet.
   1. Create an Excel spreadsheet showing the following:
      a. Camera number

b. Camera part number
c. IP address
d. MAC address
e. Owners chosen camera name
f. Provide to the owner and designer.

3.03 INSTALLATION

A. Each camera shall be installed to provide maximum field of view and security.
B. Exterior cameras shall be mounted securely to the structure and shall be sealed to prevent water or any other environmental condition to enter the camera.
   1. Provide the correct mount for the location of each exterior camera.
   2. Where the mount is to the outside of a building then the contractor shall install a conduit from the exterior camera to the inside of the building for the camera cable(s).
   3. Review mounting location to determine optimum height of camera to cover all areas and provide the clearest pictures. Mount at appropriate height.
   4. Work with the Owner to focus and align all cameras for maximum coverage.
   5. Contractor shall change lenses for different focal lengths based on the actual installation location of the cameras and the requirements of the Owner.
   6. Seal around all conduit openings and the camera mount to seal from water and air infiltration.
   7. Install patch cable through the conduit and connect to the CAT-6 cable on the interior of the building.
C. Interior cameras shall be mounted in the lay-in ceiling, supported from the open ceiling or to the wall with a structural mount.
   1. The Contractor shall work with the Owner to determine the location of all the cameras.
   2. Work with the Owner to determine the direction of the lens and its focal length.
   3. Ensure that the camera is mounted securely to the drop ceiling and is supported from the T-bar.
   4. Where interior cameras are mounted to the wall, the Contractor shall provide a mount that will allow all cables to route through the mount. Cables shall not be “free-floating” from the wall to the camera.
   5. When a camera is pendant mounted the contractor shall install a down-pipe and conduit support to mount the camera at the correct height as determined by the owner.
D. Contractor shall focus and aim all cameras
   1. Camera aiming and focusing shall be a process where the owner has input at each stage.
   2. The process for aiming and focusing shall be as follows:
      a. Meet with the owner and determine the desired view of each camera. Determine where images shall overlap and what they are focusing etc.
         1) Add this information to the camera naming spreadsheet.
      b. Install the cameras and aim as per the meeting notes.
      c. Meet with the owner and review each camera view on the monitor. Make notes of any changes required.
      d. Schedule a time to make all changes.
         1) Changes shall be made while the owner is reviewing the live image through the VMS Software. The contractor shall have a person at the camera that can aim and focus the camera.

2) Once the owner agrees on the image aim and focus generate a still picture of that image and keep it in a file.
3) Print the aimed view and provide as part of the submittal at project substantial completion.

E. Camera naming
1. The contractor shall work with the owner and engineer to determine the naming and numbering convention for the cameras.
2. Determine the naming and then apply that to each camera. Enter the designation of the camera into the video security system.
3. On all cameras the contractor shall affix a label with the camera number to the exterior case of the camera. This shall be visible when standing near the camera.

END OF SECTION 283700

SECTION 285450 – AUDIO EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Parts and equipment required for audio enhancement and distribution.

1.02 SYSTEM DESCRIPTION

A. The audio system shall be installed and configured to provide maximum coverage in each room.
B. The audio systems shall be installed to provide the easiest user interface possible.

1.03 COORDINATION

A. Coordinate the location of all racks, cabinets, and equipment with other contractors.
B. Coordinate with other Contractors who are doing work in the ceiling space. Coordinate the installation of all cables, speakers, etc., with the locations of other services.

PART 2 - PRODUCTS

2.01 AUDIO AMPLIFIERS

A. General Audio Amplifier
1. All amplifiers shall be rack mounted.
2. Amplifier shall employ a safety system to protect itself and speakers from line shorts, thermal overload, power surges, signal degradation, and signal overload.
3. Inputs shall be 3.5mm or direct wired connectors
4. Amplifier shall be capable of mono or stereo output and processing.
5. Input sensitivity of .05 percent at 8 ohms, 1 kHz or better
6. Amplifier shall have LED’s showing that the input is connected, that 1 or more of the protections for the unit have been activated, and that the unit has activated its output limiters.
7. Frequency response of 20HZ to 20KHz
8. Audio amplifier shall be QSC SPA series or equal.
9. See table for different amplifier types
10. Channels 2 4 2 4
11. Stereo Mode (all channels driven)
12. 8Ω 60 W 60 W 200 W 100 W
13. 4Ω 60 W 60 W 200 W 100 W
14. Bridged Outputs (per bridged output pair)
15. 8Ω & 4Ω 200 W 200 W 400 W 200W
16. 70V 250 W 250 W 350 W 350 W*
17. 100V 250 W 250 W 350 W 350 W*

QSC Part #	SPA2-60 2-channel	SPA4-60 4-channel	SPA2-200 2-channel	SPA4-100 4-channel
Stereo mode @4&8 OHM	60W	60W	200W	100W

Bridged @4&* OHM	200W	200W	400W	200W
70/100 volt bridged	250W	250W	350W	350W

2.02 AUDIO MIXERS

A. 4-channel audio mixer with Bluetooth and USB inputs.
   1. May be used for athletic events. See drawings for mounting location.
   2. 4-channel stereo line mixer shall include:
      a. Microphone input with 2-band EQ (balanced XLR-1/4" combo)
      b. Stereo line input (rear mounted RCA inputs, front-mounted stereo 1/4" and 1/8" [3.5mm])
      c. Bluetooth connectivity to wirelessly stream music
      d. USB port for use with phone charging
      e. Voiceover control with priority ducking and variable hold time
      f. Rear panel master volume control
      g. 15V phantom power
      h. Mono/Stereo output switch
      i. Compact, half-rack steel chassis
      j. Rackmount kit and power adapter
   3. Shall be Samson #SM4 or equal

B. 2-port audio mixer and mic preamp
   1. Bus-powered USB 2.0/iPad® audio interface
   2. 24-bit resolution; 44.1, 48, 88.2, and 96 kHz sampling rate
   3. Compatible with almost all recording software for Mac®, Windows®, and iPad
   4. 2 microphone inputs with low-noise, high-headroom, Class A mic preamplifiers and +48V
   5. 2 switchable line/instrument inputs
   6. 2 balanced ¼” TRS main line-level outputs
   7. 1x1 MIDI In/Out
   8. Stereo headphone output with independent level control
   9. Zero-latency monitoring via internal analog mixer (Mix knob)
   10. Large main volume knob
   11. Signal present and clipping LEDs
   12. Metal chassis
   13. Shall be Presonus #iTwo or equal

C. 8-port audio mixer
   1. Mixer shall provide 8 inputs and one output
   2. Inputs:
      a. 8 XLR MIC inputs or ¼” Line level input.
      b. Individually switchable +48 VDC Phantom power
   3. Output:
      a. RCA Prefader master output
      b.
   4. Each input shall include a rotary level control, LED peak indicator, high pass filter switch.
   5. Shall provide for two outputs with level control
   6. Mixer shall be rack mounted.
   7. Mixer shall be Rolls #RM82 or equal

2.03 AUDIO DEVICES

A. Rack Mount 1-Disc CD Player:

1. The CD player portion of the installation shall be capable of 1-disc automatic loading. CD player shall be capable of:
    a. Integrated Ipod Dock
    b. Rack Mounting
    c. Play MP3, WAV
    d. Random and continuous play.
    e. Bluetooth Connectivity
2. Rack Mount CD Player shall be TASCAM #CD-200BT or equal.

B. Bluetooth Extender
1. Provide a faceplate-based Bluetooth receiver and sending unit.
2. Install a receiver for the sending unit and connect as an input to the audio system.
3. Provide raceway and a backbox/faceplate for the receiver.
4. Install cabling from the receiver to the sending unit.
5. Connect to one of the ports on the audio mixer/dsp.
6. All cabling shall be plenum rated
7. Wall-mounted faceplate-based Bluetooth sending unit shall be RDL #D-BT1A or equal.
8. 3.5mm audio input plate shall be RDL D-TPS8A
9. Receiver shall be RDL #TX-TPR1A or equal.

2.04 WIRELESS MICROPHONES
A. Wireless Microphone Kits:
1. Wireless systems shall be based around the Audix R41 or R42 series receiver.
2. Equip with the following where required.
    a. AUDIX Antenna Amplifier/Distro for System #ADS48
    b. AUDIX External, Remote Directional Antenna #ANT-D360
    c. For antenna cable to remote antennas, use Belden RG6 UHF Cable #1829A for ANT-D360 Antennas
    d. Mount the Remote antennas up at the red iron to cover the entire room
3. Wireless Receiver shall have two channels or provide multiple single channel receivers.
    a. 32 MHz Wide spectrum tuning receiver
    b. 106 Pre-coordinated frequencies
    c. Up to 4 systems (8 channels) simultaneous use
    d. 21 dB Audio gain stage in 3 dB steps
    e. Internal antenna combiner for dual antenna operation
    f. 300’ (91 meters) Operating range
    g. 19” Rackmount chassis with front mount antenna kit shall be included
    h. Single Channel receiver shall be Audix R41 or equal
    i. Dual Channel Receiver shall be Audix R42 or equal
4. Bodypack shall be:
    a. 64 MHz Wide spectrum transmitter
    b. Precision metal housing
    c. Modular antenna design
    d. May be used with lavalier, head worn and instrument mics
    e. AF and RF gain control
    f. High contrast LCD display with group, channel and battery indicator
    g. Soft mute switch
    h. 10 Hour run time - AA batteries
    i. Provide (3) three sets of batteries

j. Shall be Audix B60 or equal. Shall be compatible with receiver

5. Lavalier wireless microphone. It shall consist of:
   a. (1) Audix #L5 Professional Lavalier Microphone with Cardioid capsule
6. Handheld wireless mic/transmitter shall be
   a. 64 MHz Wide spectrum transmitter
   b. Durable metal housing
   c. AF and RF gain control
   d. Modular and interchangeable capsule assemblies
   e. High contrast LCD display with group, channel and battery indicator
   f. Soft mute switch
   g. 10 Hour run time - AA batteries
   h. Shall be Audix #H60 or equal.

B. Wireless Microphone Extension Antenna.
1. Where required the contractor shall install an antenna in the room where the microphones are to be use.
2. All cabling shall be plenum rated unless noted otherwise.
3. When more than 1 wireless microphone will be used in the same room and the receivers are to be installed in a rack or cabinet, the Contractor shall provide an active antenna combining unit.
4. The antenna combiner shall be rack mountable.
5. Provide the correct antenna extension kit with the active combiner to place the antennas in the same room as the transmitter.

2.05 WIRED MICROPHONES

A. Wired microphone for handheld use shall have the following characteristics:
1. The microphone shall be equipped with a lockable ON/OFF switch and an internal impedance selection socket located on the XLR connector for switching between high and low impedance. A slip in swivel adapter shall be supplied for the convenience of stand mounted use.
2. Controlled low frequency response combined with a smooth high frequency rise for clear and intelligible voice pickup.
3. Hypercardoid pickup pattern for minimized feedback.
4. Spherical grille shall provide effective filtering out of breath noise and popping when used for close up vocals, and of wind noise when used outdoors.
5. Lockable ON/OFF switch.
6. Equipped with a 3-pin professional audio (XLR) connector.
7. Frequency response shall be 50 to 18,000 Hz.
8. Wired, handheld microphone shall be Audix #OM3 or equivalent.
   a. Provide a 25-foot microphone cable with each microphone.

2.06 WALL MOUNT RACK

A. Wall Mount Cabinet:
1. The wall mount cabinets shall be black in color.
2. Cabinets shall provide adjustable 19-inch rack mounting rails.
3. Each cabinet shall have a center swingout feature that allows access to the front and back of equipment after it is installed in the cabinet.
4. Knockouts for different size conduits shall be provided on the top and bottom of the cabinet.
5. Swing side of the cabinet shall be reversible.
6. Each cabinet shall be no less than 23.5 inches deep.
7. 36” tall cabinet shall be Hoffman # EWMWG362425

8.
9. Each cabinet shall be provided with the following hardware:
    a. Plexiglas front door with lock.
    b. Fan assembly mounted in the top of the cabinet. Hoffman #EWMF2
    c. 6 position power strip with circuit breaker and surge suppressor.

2.07 RACK AND CABINET ACCESSORIES

A. Surge Protection and power strip.
    1. This device will provide the only power on-off switch for the sound system.
    2. All equipment mounted in the rack will be connected to this device.
    3. No electronic device shall be powered from any non-protected power source
        a. SurgeX, # SX1120RT 20A/120VAC;
B. Rack Mount drawer:
    1. Drawer shall be mounted in standard 19 inch mounting rails.
    2. Drawer shall be made of steel and shall be black in color.
    3. 4-RU Rack-mount drawer shall be Lowell #UDEL-414.
C. Where required, provide a balancing transformer for Ipod connections. Transformer shall be RDL #TX-10B or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Location of the communications infrastructure shall be finalized in the communications room prior to installation.
B. Locate all equipment to be installed, and make certain that space is available for maintenance and service during the life of the system.
C. If any changes from the drawings are required, the Contractor shall submit a proposed layout of the communications layout to the Engineer for approval prior to installation.

3.02 RACKS AND CABINETS

A. Coordinate with all other Contractors and ensure that the locations of all cable tray and conduits are correct and will feed the rack system adequately.
B. Cabinets mounted to the wall shall be securely attached.
    1. Where the cabinets are to be mounted to a wall, the Contractor shall first install a piece of plywood to be used to mount the cabinet on. Secure the plywood to the wall then secure the cabinet to the plywood and wall where possible.
    2. Review the facilities above a cabinet prior to installation. When possible, cabinets should not be installed below water pipes or other facilities in the ceiling.
    3. Mount the cabinet so that the top of the cabinet is not more than 7 feet AFF.
    4. Check to make sure that the cabinet will be able to fully open from both hinges after installation. Change mounting location to accommodate the opening.
    5. Install support wheels to the cabinet to support the weight of the cabinet when it is closed if the cabinet is 6’ tall or more.

3.03 AUDIO ELECTRONICS INSTALLATION

A. Contractor shall review design and building prior to ordering all components.
B. The Contractor shall be responsible for providing a complete system including all parts required for connectivity of all components.

C. All cables, connectors, supports, boxes, etc., shall be the responsibility of the Contractor.
D. The Contractor shall refer to the drawings for the installation notes and locations in the racks of all the equipment. If changes are required in the field, the Contractor shall submit the proposed changes in the form of updated rack/cabinet layouts. The Engineer shall have the final say on proposed changes.
E. All components required for a well-functioning system shall be provided and installed.
F. Interconnections between speakers and amplifiers shall be via terminal strips. Speakers shall not be directly connected to an amplifier. Terminal strips shall be mounted to the side of a cabinet, or to a piece of wood mounted to the back of the rack.
    1. Provide self-adhesive labels for each of the speaker wires that come back to the terminal strip. Attach stickers to the area beside the terminal that the wire is connected to.
    2. All wires terminated to the terminal strip shall have spade lugs attached. Size the spade lugs for the size wire and size of screw on the terminal strip.
G. When connecting speakers to the amplifiers, ensure the correct polarity throughout the system.
H. Contractor shall label all the volume, gain, etc., controls on all mixers and processors. The labels shall be self-adhesive labels. All labels shall specify the device that dial controls. All labels shall be laser-printed; handwritten labels are not allowed.
I. After connection of the system, the Contractor shall configure all components to ensure the best sound possible.
    1. Contractor shall ensure that the correct speakers are connected to the correct output of the amplifier. This includes the surround sound processor (if applicable) and amplifier. contractor shall ensure that connections are made to each speaker.
    2. Audio output shall be routed through the digital signal processor (if applicable) to limit the feedback noise to the speakers. Contractor shall consult with the manufacturer and ensure that the eliminator has been configured correctly.
    3. Where a graphic equalizer is installed, the Contractor shall balance all the signals to provide the best sound possible. Utilize an acoustical tester.
    4. All inputs such as CD players shall be integrated into the system. Utilize mixers and automatic mixers to combine microphones and other inputs.
    5. Contractor shall test each and every input and output of the system. Contractor shall have the Engineer and Owner present for final testing and system checkout.
J. After installation, the Contractor shall provide as-builts and all component documentation.

3.04 MICROPHONE INSTALLATION.
A. All wired microphones shall be provided with a microphone cord. The cord shall have a female XLR connector for connection to the microphone, and a male connector for connection to the wallplate.
    1. Each cable shall be a minimum of 15 feet long. For gymnasiums and other locations where a longer cable may be required, provide a cable no shorter than 25 feet.
    2. At each wallplate/floorbox connection to an XLR, provide an engraved lamacoid label detailing the number of the microphone cable attached to the

back of the wallplate. Stick the label to the wallplate just above the XLR connector.

3. Contractor shall install wireless microphones where shown on the drawings.
4. Wireless receiving units shall be rack mounted.
5. Where the receiving unit is not in the room where the transmitter is located, the Contractor shall install antenna extensions for each receiver.
6. The antenna shall be mounted in the room where the transmitter is to be located. Install the extension cables and antenna as per the manufacturer's recommendations.
7. Where more than 1 receiver is in the same rack/cabinet, the Contractor shall install an active antenna consolidator that has the capability to combine up to 4 receivers. This consolidator shall then have antenna extensions located in the room the users will be transmitting from.
8. Contractor shall be responsible for all cables and connectors needed to connect antennas.
9. Provide either a handheld wireless microphone or belt pack and lavalier/headworn mic with each wireless receiver. Refer to the drawings for the type of microphone to provide.
    a. Contractor shall match the transmitter frequency to the receiver frequency.
    b. Where multiple receivers are required, ensure that the frequencies are all different, and that there will be no interference from the local radio signals from TV stations.
    c. Label each receiver and transmitter for the frequency chosen.
10. Contractor shall provide wind screens for all microphones provided.
11. After installation, the Contractor shall demonstrate that each wireless microphone works at any point in the room that it serves. The Contractor shall further demonstrate that the microphones all can work at the same time without interference.
12. All microphones shall have new batteries provided at the time of installation.

3.05 AUDIO SYSTEM

A. The entire audio systems shall be configured to be a complete working system.
B. The Contractor shall label each speaker cable at each end with a wraparound label that has been laser printed.
    1. The Contractor shall give each speaker wire a separate designator. The Engineer shall approve the proposed numbering prior to printing the labels.
C. Each component shall be labeled for what it does and what it provides. Labels shall be laser printed, and shall be attached to the front of each unit.
    1. For example, the amplifier in a cabinet may be marked "Microphone Amplifier-First Floor Hallway."
D. It is extremely important that each microphone cable be labeled at each end with a laser printed wrap around label. This will allow the Owner to know exactly which microphone is being connected.
    1. Where microphones are terminated, the Contractor shall provide a minimum of 3 feet of spare cable for future movements.
    2. The Contractor shall provide the proposed labeling of the microphone cables prior to the actual installation of the labels.

3.06 COMMISSIONING

A. The Audio Contractor will provide a technician to assist the Consultant during the commissioning of the system. The technician will be ready and available to make any necessary adjustments or repairs to the system that the Consultant finds in error of the specification.
B. The Audio Contractor will have on hand all installation documentation and equipment manuals. The Audio Contractor will have the necessary tools available for any adjustment or repairs.
C. Once the system is commissioned, the Audio Contractor will provide final As-built documents to the Consultant for review. These documents will reflect the true condition of the system after commissioning.

END OF SECTION 285450

SECTION 285453 – AUDIO SPEAKERS

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Parts and equipment required for audio speakers and speakers supports.

1.02 SYSTEM DESCRIPTION
A. The speakers shall be installed and configured to provide maximum coverage in each room.
B. Install to allow maintenance to all speakers.
C. Each speaker in an open ceiling shall be equipped with an aircraft cable safety cable.

1.03 COORDINATION
A. Coordinate the location of all racks, cabinets, and audio equipment
B. Coordinate with other Contractors who are doing work in the ceiling space. Coordinate the installation of all cables, speakers, etc., with the locations of other services.

PART 2 - PRODUCTS

2.01 PENDANT MOUNT GYMNASIUM OR CAFETERIA HIGH CEILING SPEAKERS
A. Open Ceiling suspended speaker
1. For large areas that require high quality audio
2. Speakers shall be supported from building structure on the manufacturers recommended mount. Provide conduit and mounting hardware to support from structure. This shall include unistrut and threaded rod where required.
3. Speaker shall have 8” coaxial cone driver that provides 90 degree coverage with a 19mm tweeter
4. Frequency response shall be 55hz to 15,000 Hz
5. Speaker shall have 70-volt transformer taps with 60 watts being the top end.
6. Sensitivity shall be 92 dB SPL at 1 meter with 1 watt of pink noise.
7. Speaker shall be fully enclosed and white in color.
8. Each speaker shall be equipped with a mount and hardware that provides for its installation in a secure manner
9. Speaker shall be Atlas Sound #PM8CX-WH or equal

PART 3 - EXECUTION

3.01 EXAMINATION
A. Location of the communications infrastructure shall be finalized in the communications room prior to installation.
B. Locate all speakers and ceiling types where speakers are to be installed, Review prior to ordering and provide correct speakers and speaker mounting hardware

C. Where speakers are mounted from the ceiling or other structure the contractor shall provide all mounting hardware and misc. hardware.
D. If any changes from the drawings are required, the Contractor shall submit a proposed layout of the speakers to the designer for approval prior to installation.

3.02 WALL OR OPEN CEILING SPEAKERS

A. Speakers hung from the ceiling shall be positioned to provide full coverage of the area.
B. The Contractor shall suspend speaker from the ceiling where shown on the drawings. The Contractor shall be responsible for installing the speakers at the correct angle to fully cover the area.
    1. Complete all calculations to aim all speakers and fully cover the area evenly with audio.
    2. Provide all hardware from manufacturer and misc. hardware required to mount the speakers from the building structure.
C. Contractor shall provide all the equipment required for mounting each speaker. Use manufacturer's recommended supports when possible.
D. Align speaker so that they provide full coverage of the area.
E. The Contractor shall leave a coil of speaker wire in the ceiling to allow lowering of the speaker for maintenance and removal.
F. The Contractor shall work with the manufacturer to determine the best layout of the speakers, and shall submit that layout for review prior to installation. The Engineer shall approve the layout prior to installation.
G. After installation, the entire system shall be tested, and it shall be demonstrated that each speaker is in connected and in good working order.
H. It shall be further demonstrated that all audio can be easily heard throughout each room where speakers have been installed.
I. Contractor shall provide all speaker wire and connectors required to connect the system.
J. Ensure that all speakers have been connected to the correct amplifier.
K. Where speakers are exterior installed the cabling shall be weatherproof and all connectors shall be weatherproof

END OF SECTION 285453

SECTION 285470 – AV CABLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes parts and equipment required for installation, termination, and testing of user communications cables.

1.02 SYSTEM DESCRIPTION

A. Cabling and infrastructure shall be fully installed and connected and labeled.
B. Products and installation detailed in this section shall comply with all applicable requirements.

1.03 COORDINATION

A. All cables shall be coordinated with the installation of the telecommunications raceways.
B. Coordinate all cables with the furniture to be installed in the building. Make any adjustments prior to cable being installed.

PART 2 - PRODUCTS

2.01 FACEPLATES

A. Custom AV plates.
    1. Some locations will require custom stainless-steel plates. These shall be configured with the correct connectors and pass thru's to support all the data, audio and video.
    2. All shall be silk-screened to detail what each connector is for.
    3. Submit a product sheet for approval prior to purchase of the plates.
    4. UTP Jacks shall be flush with the front of the plate
    5. Stainless Steel coverplate with Style-Line (GFI) opening
        a. Single-gang plates shall be Hubbell #SS26
        b. Double-gang plates shall be Hubbell #SS262
    6. Provide custom plates for various audio and video inputs.
    7. Plates shall be aluminum or steel.
    8. Shall be custom plates or style-line style with stainless steel plates.
    9. See drawings for description
    10. Shall be Covid Brand or equal
B. Stainless Steel coverplate with Style-Line (GFI) opening
    1. Single-gang plates shall be Hubbell #SS26
    2. Double-gang plates shall be Hubbell #SS262
C. Brush opening plate
    1. Where routing AV cables through an open backbox the contractor shall install a "brush" plate that covers the backbox and allows cable to pass thru
    2. Provide a single or double gang cover plate with GFI openings.
    3. Single-gang plates shall be Hubbell #SS26 with Leviton #41078-DBW, White in color or equal

4. Double-gang plates shall be Hubbell #SS262 with Two (2), Leviton #41078-DBW, White in color or equal

D. Style-line (GFI Rectangular) and 106 style inserts.
1. In addition to flush faceplates and surface housings, some installations call for integrated furniture outlets, GFI style outlets, and standard 106 style frames. These may be required at some surface raceway location. Field verify prior to ordering.
2. The Contractors shall identify which type of outlet or frame is required at each location throughout the system.
3. Match the outlet with the faceplate required.
4. GFI, more commonly referred to as style line outlets, are rectangular and fit in a rectangular plate used for GFI receptacles.
5. Each type of modular furniture has certain requirements for its voice and data modules. The Contractor shall coordinate with the furniture installer and provide the correct faceplate and outlets to match the color and style of the furniture.
6. The 106 style frame fits in a common duplex electrical receptacle faceplate. The frame holds 2 or 4 modular jacks.
7. For all connections that do not have a faceplate with a location for a laser printed paper label, the Contractor shall provide an engraved lamacoid label detailing the location number of each cable.
8. GFI/Style-line Plates shall be:
   a. Two port, Hubbell # NS612W
   b. Three port, Hubbell # NS613W,
   c. Four port, Hubbell # NS614W
   d. Six port, Hubbell # NS616W.
   e. Blank, Hubbell #NS620W
9. 106 style plates shall be
   a. Two port, Hubbell # BR106C
   b. Four port, Hubbell #Q106O

2.02 SURFACE MOUNT BOXES

A. Provide surface mount boxes for termination of cables as shown on the drawings.
1. Install a surface mount box at location for termination of the modular jacks.
2. One port surface box shall be Hubbell #HSB1BK.
3. Two port surface box shall be Hubbell #HSB2BK

2.03 AUDIO CABLING

A. Audio Cables
1. Cable to be used for connection of the Audio between devices.
2. Cables in the ceiling shall be plenum rated.
   a. Where noted the audio shall be terminated onto the back of a connector at the faceplate.
   b. Coordinate cable terminations with the devices to which they will connect.
   c. Label each cable at each termination point for the device at the other end of the cable. Include port number.

B. Speaker Wire:
1. The Contractor shall size the speaker wire for the distance between the amplifier and the speaker, as well as the impedance of the speaker.
2. Speaker wire resistance shall not exceed 7 percent of the speakers' impedance.

3. Speaker wire shall be no smaller than 18 AWG.
4. Speaker wire shall be high conductivity, copper cable. Cable shall be of single pair, stranded construction. Cable shall be 2 parallel cables, black in color and 1 of the conductors shall be marked for identification at each end.
5. Cable shall be a minimum of 99.95 percent copper.
6. Provide plenum rated wire when the cable will route through a plenum area. Contractor shall be responsible for identifying plenum areas.
7. Speaker cables for these systems shall be homeruns from the speaker to the terminal strip. There shall be no splices in the cable.
    a. 18 AWG plenum Speaker cable shall be West Penn #25224B

C. Microphone bulk cable:
1. Microphone cable shall be for use with all types of microphones.
2. Each microphone cable to be terminated in the field shall have 4 conductors of which two are used for each terminal on an XLR connector.
3. Cable shall contain 4 stranded, 24 AWG conductors covered with a braided shield with a minimum of 75 percent coverage.
4. Microphone cable shall be yellow in color.
5. Microphone cable, Riser rated shall be Belden 1800B or equivalent.
6. Microphone cable, Plenum rated shall be Belden 1801B or equivalent.
7. All microphone cable shall be terminated with 3-pin XLR connectors. Connectors shall be Neutrik #NC3MX or equivalent.

D. Microphone XLR plate
1. Stainless Steel plates
    a. Single-Gang plate 3-PIN XLR connector pass thru.
        1) Neutrik #103F
    b. Single-Gang plate with HDMI and 3.5mm audio pass thru plate with pigtails
        1) Cables 2 Go #39871

E. Line Level Audio
1. To connect audio equipment at line level the contractor shall provide cables for connection.
2. Where bulk cable is used for phoenix style connectors the contractor shall provide single-pair stranded audio cable.
3. Microphone cable shall be 24 AWG (7x32) tinned copper
    a. Overall Shield with 100% coverage
    b. Plenum rated cable shall be Belden #1801B
    c. Non-Plenum shall be Belden 1800B
    d. Underground Audio line-level cable shall be Belden #5500F1

2.04 PATCH CABLES

A. Contractor shall provide all patch cables and gender changers required for a complete system.
B. Provide all flexible connections for video HDMI connections where required to connect to a device and the long-distance HDMI cable is not flexible enough.
C. All patch cables between devices that hard wire between devices shall be labeled at each end detailing which device they connect to at the other end.
D. Provide tabletop and device side patch cables for connection of all devices at the conference room tables etc.
E. Patch cables shall be provided at each faceplate or tabletop device and all connections at the plate. Shall be no shorter than:
1. 8’ for top of table connection to table mounted plates

2. 15’ for connection from table to wall mounted plates.

2.05 CABLE INSTALLATION TOOLS

A. Cable covering Nylon Mesh
   1. To connect the faceplate on the wall to the desk or cabinet or other device install a flexible, semi-rigid, split braid.
   2. Install all AV and data cables thru through a nylon mesh cable cover.
   3. Mesh cover shall be flexible and shall be tie wrapped to the cables at each end.
   4. Nylon Mesh shall be Tech Flex #F6Nx.xx series or equal.
   5. Shall be White at the projector, black as it transitions from wall to desk or lectern.

B. All cables shall be supported in the ceiling a minimum of every 5 feet. Support can be provided by installing cable inside cable tray or conduit, or by installing J-hooks every 5 feet.
   1. J-hooks shall provide a smooth steel or plenum rated plastic, support for cables as they route through the ceiling.
   2. Steel supports shall have a galvanized finish.
   3. Steel, UL listed, ultimate static load limit 50 pounds rated to support Category 5e and higher cables, and optical fiber cables.
   4. If required, assemble to manufacturer recommended specialty fasteners, including beam clips and flange clips.
   5. Acceptable products shall be:
      a. CADDY #CAT HP series with retainer hooks.
      b. CADDY #CAT-CM SERIES
   6. Provide with interfaces and clamps required to support J-Hooks from the building structure.
   7. Provide threaded rod and associated hardware required to support all J-Hooks

C. Firestopping shall be completed inside and around all conduits after cable installation. Firestop for the area between the cable and the edge of the conduit shall be Nelson No. FSP, CLK or LBS+. Contractor shall install the best firestop for each individual installation.
   1. Firestop shall be installed with regard to local and national building codes.
   2. The firestop shall be a putty like substance that expands under heat and will not allow flame to pass for a designated period of time.
   3. Firestop shall conform to all NEC, NFPA, and UL requirements.
   4. Some wall pass-thru’s are shown on the drawings. The Contractor shall utilize these where possible.
   5. Where the contractor must install cables through a wall where there is no pass-thru already provided, the Contractor shall be responsible for installing a fire-rated pass-thru and fire-stopping the conduit after cable installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine all pathways prior to installation of all cables.
   1. Identify locations of all user conduits and backboxes prior to cable installation.
   2. Walk thru the building during construction and identify all boxes
   3. Coordinate installation of height of all boxes with the raceway installer.

3.02 PREPARATION

A. Locate main path for all cables and install J-hooks where cable tray is not provided.
B. Coordinate with other trades to install a clear, straight path down major corridors for the routing of user cables back to the communications closet.
C. Meet with construction manager to understand timing of ceiling grid and drop ceiling tiles.
D. Meet with electrical contractor to understand power installation schedule.

3.03 AUDIO AND VIDEO CABLE INSTALLATION

A. All AV cabling shall be installed according to TIA/EIA 568 standards, including all updates and addenda.
   1. When installing AV cables, care shall be taken to avoid crimping or bending the cable past the manufacturer's recommended bend radius.
   2. During installation, the cables shall not be pulled across the ceiling tiles or the structure of the building. This may cause damage to the cable jacket.
   3. Adhere to all pulling tensions and bend radii during installation. Excessive pulling or bending can cause the cable to fail tests after installation. Any cable that does not pass the intended signal after installation shall be fixed or replaced at the Contractor's expense.
   4. All cables shall route neatly in the ceiling. Whether they route in cable tray or J-hooks, the cables shall be neat and orderly.
   5. Install J-hooks and other cable supports to support all cables for the AV systems.
      a. In Gyms and cafeteria's, the contractor shall hide the speaker cable in the building steel whenever possible.
   6. Support all cables at a minimum of every 5 feet.
   7. Provide a short coil of extra cable where the cable enters the vertical conduit. The coil shall consist of no less than 1-1/2 feet.
   8. Provide enough slack in the backbox, to fully remove the faceplate and jack and allow work to be done on the cable.
   9. When installing cables in the communications room and AV cabinets, all cable shall route neatly through the cable tray and cable ladder and along the side of the cabinets.
      a. Install cable routing panels in the cabinets and racks where required.
   10. When transitioning from the ceiling area to the rack or cabinet, all cable shall route through conduits or be attached to vertical section of cable ladder.
      a. The Contractor shall provide the conduits shown and any additional conduits or cable ladder required to neatly transition cables from the ceiling to the rack.
   11. Cables shall route down each side of a rack for termination. Split each panel into 2 sides.
   12. All speaker cables shall be terminated on a terminal strip.
      a. Attach this terminal strip to the wall or to a panel in the rack.cabinet.
      b. Identify each speaker cables at the terminal strip and on each side of the strip
      c. Install patch cables from terminal strip to the amplifiers. Label the speaker cable at the amplifier
   13. When terminating cables, ensure that the smallest amount of jacket is removed from the final termination point of the cables.
   14. Provide a service loop of the cables on the wall or to side of cabinet. The loop shall extend no less than 1 foot below the termination point on the patch panel.

Route the cables 1 foot below the device, and then back up to the device. This will provide room for future moves and additions to the rack.

15. Each cable shall have a self-adhesive, self-laminating, laser printed label at each end. The label shall show the device the cable attached to.
    a. Labels shall be installed no more than 4 inches from the termination point of the cable.

3.04 FACEPLATE/CUSTOM PLATE INSTALLATION

A. Faceplates/custom plates shall be mounted straight and level with the floor and walls of the building.
    1. Jacks and/or connectors shall be terminated to the appropriate cable and inserted in the correct orientation into the faceplate prior to the mounting of the faceplate.
    2. Each connector shall have a laser-printed or engraved/painted label detailing what it connects to.
    3. Cable slack shall be stored behind the faceplate in such a way that allows the minimum bend radius of the cables to be maintained as per the following:
    4. Care shall be taken when mounting the faceplate to avoid crimping or kinking the cables.
    5. Equip with all connectors and pass thru's shown on the drawings.
    6. Provide a cutsheet on the custom plates as part of the submittal process. Get designer approval prior to ordering and labeling.

3.05 PATCH CABLE INSTALLATION.

A. The contractor shall provide and install all patch cables and gender changes and baluns as required for complete system connectivity.
B. Install patch cables from the table or floorbox to the tabletop for connection of the systems.
C. Provide and install any DVI or Display port to HDMI devices for transmission of the AV signals
    1. Connect each device to the plate or other device with patch cables and interconnection cables.
    2. Keep all patch cables short where possible unless otherwise noted on the drawings. Large coils of extra patch cables are not required.
    3. Where there are two of the same type of cables routing to one device, provide different color cables or provide different color tape at each end of each cable.

3.06 CABLE MESH

A. Nylon Mesh.
    1. At each lectern location, the contractor shall install the patch cables between the wall faceplate and the lectern inside a mesh cable sleeve.
    2. At the projector install the cables from the backbox or drop ceiling through the mesh. Match color of wall when possible.
        a. The contractor shall route all cables through the nylon mesh. This includes all data and AV cables.
        b. Install the power cable inside the mesh.
        c. Tie wrap the nylon mesh at each end.

END OF SECTION 285470

SECTION 287100 – TECHNOLOGY PASS-THRU AND FIRESTOP

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Round sleeves.
   2. Sleeve seal systems.
   3. Grout.
   4. Pourable sealants.
   5. Foam sealants.

PART 2 - PRODUCTS

2.01 FIRESTOP PRODUCTS

A. Each contractor shall be responsible for firestopping around their cables and the raceways.

B. Shall be completed inside and around all conduits after cable installation.

C. Firestop for the area between the cable and the edge of the conduit shall be Nelson No. FSP, CLK or LBS+. Contractor shall install the best firestop for each individual installation.
   1. Firestop shall be installed with regard to local and national building codes.
   2. The firestop shall be a putty like substance that expands under heat and will not allow flame to pass for a designated period of time.
   3. Firestop shall conform to all NEC, NFPA, and UL requirements.
   4. Some wall pass-thru' s are shown on the drawings. The Contractor shall utilize these where possible.
   5. Where the contractor must install cables through a wall where there is no pass-thru already provided, the Contractor shall be responsible for installing a fire-rated pass-thru and fire-stopping the conduit after cable installation.

D. Firestopping is required at all riser conduits and all pass thru's.
   1. Each cable tray penetration of a wall shall be firestopped after cable installation. Use pillow type firestop to allow additional cables to be installed in the future.
   2. Where riser conduits pass through floors, the area between the concrete and the conduit shall be firestopped. This shall be completed with a putty or liquid firestop product. Fill in the space with mineral wool, and then install the firestop on top. All firestop shall be of sufficient thickness to secure the rating required by code.
   3. After final cable installation, install a putty firestop around all cables where they enter and exit conduit pass thru's and conduit risers.
   4. All firestop shall be installed to provide the fire rating as described by local fire code.

5. It shall be the responsibility of the Contractor to verify that all conduits, walls, and raceways required to be firestopped have been firestopped.

E. Contractor shall provide a label at each penetration and firestop location detailing the UL rated fireproofing solution that was used in the specific application.
   1. Apply sticker to the wall near the firestopped conduit.
   2. Provide a sample of the label to the designer for review as part of the submittals.

2.02 ROUND SLEEVES

A. Wall Sleeves, Steel:
   1. Description: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.

B. Sheet Metal Sleeves, Galvanized Steel, Round:
   1. Description: Galvanized-steel sheet; thickness not less than 0.0239-inch; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.03 GROUT

A. Description: Non-shrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
   1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
   2. Design Mix: 5000-psi, 28-day compressive strength.
   3. Packaging: Premixed and factory packaged.

2.04 POURABLE SEALANTS

A. Description: Single-component, neutral-curing elastomeric sealants of grade indicated below.
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2.05 FOAM SEALANTS

A. Description: Multi-component, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 - EXECUTION

3.01 SLEEVES AND PASS THRU’S

3.02 Installation of sleeves for non-fire-rated electrical penetrations
   A. Comply with NECA 1.

3.03 Sleeves for conduits penetrating above-grade, non-fire-rated, concrete and masonry-unit floors and walls:
   A. Interior penetrations of non-fire-rated walls and floors:
      1. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
      2. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in section 079200 "joint sealants."
   B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

C. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway or cable, unless sleeve seal system is to be installed.
D. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
E. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

3.04 Sleeves for conduits penetrating non-fire-rated wall assemblies:
A. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
B. Seal space outside of sleeves with approved joint compound for wall assemblies.

3.05 Aboveground, exterior-wall penetrations:
A. Seal penetrations using steel pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals. F. Underground, exterior-wall and floor penetrations:
B. Install steel pipe sleeves with integral water-stops. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing sleeve seal system. Install sleeve during construction of floor or wall.

3.2 install steel pipe sleeves. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing sleeve seal system. Grout sleeve into wall or floor opening.

END OF SECTION 287100

SECTION 287200 – TECHNOLOGY SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section provides the Contractor with requirements regarding Product Data Sheets, Shop Drawings and Product Samples collectively referred to as “Submittals”.
B. This section provides the Contractor requirements regarding As-Built Documentation after installation and prior to Final Completion and Final Payment
C. The requirements of this section deal only with those submittals that are required to be provided by the chosen contractor after bid award. No submittals in this section are required to be provided with the Bid Response.
D. The requirements contained herein should be considered bound and apply to all technology and security specification sections per this contract.

1.02 PRE-INSTALLATION SUBMITTALS

A. The contractor shall provide material submittals to the Construction Manager or directly to the designer, whichever is managing the project.
B. Prior to beginning work, the chosen Contractor shall provide PDF files of all material submittals.
    1. Highlight the part number of each item specifically. Submittals that are not highlighted will be rejected and sent back immediately.
    2. Match camera submittals with the camera type on the drawings. see Security Equipment Schedule on TC501. Provide marking on the PDF File detailing which camera type is being submitted.
    3. Provide the PDF with the following file names
        a. Site - Spec Section - Description
        b. In Example: Kent City 28 1600: Data Cabling submittal

1.03 AS-BUILT DOCUMENTATION

A. The contractor shall provide As-Built documentation to the Construction Manager or directly to the designer, whichever is managing the project.
B. Provide the As-Builts in hard and soft copy
    1. Hard Copy shall include all Red-lined Drawings showing what was actually installed and where it was installed.
    2. Soft copy on USB Drives (PDF or Microsoft Word or Excel) shall include all documents provided in the hard copy plus any configuration or data files. Include XLS files for all spreadsheets.

PART 2 - PRE-INSTALLATION SUBMITTALS

2.01 PRODUCT DATA SHEETS

A. Product data sheets shall consist of the manufacturers detailed specification sheets or “cut-sheets” for each product that is to be installed by the contractor or any subcontractors.
B. Product data sheets shall minimally include, but shall not be limited to:
    1. Part Number
    2. Manufacturer

3. Description of the product
4. Physical dimensions and characteristics of the product
5. Picture or manufacturers drawing of the item, where applicable
6. Electrical characteristics of the product including heat-load for active electronics.
7. Optical characteristics of the product for Fiber-Optic equipment and cable.

C. Provide product data sheets for all equipment and cabling that is to be installed by the contractor

D. Provide a PDF of all the Equipment being submitted. Each actual part number shall be highlighted on the PDF in yellow.
   1. Group Product Data Sheets by:
      a. Data Cabling
      b. Access Control
      c. Video Security
      d. Audio and Video Systems

2.02 SHOP DRAWINGS

A. Shop Drawings shall consist of detailed drawings showing actual connectivity, equipment to be installed and cable types for the systems noted below:
   1. Audio System

B. Shop drawings shall also be provided for systems that the contractor intends to connect differently than what is shown on the contract drawings or where no connectivity is shown.

2.03 PRODUCT SAMPLES

A. Product Samples shall consist of a sample of the actual product that is to be installed.

B. Samples shall be tagged with the part number and specification section to which it pertains.

C. Product Samples shall be provided for the following:
   1. None at this time.

2.04 SUBMITTAL DOCUMENTS

A. The Contractor shall provide all Submittals to the Construction Manager or the designer

B. The Contractor shall provide PDF Files for all Product Data Sheets.
   1. All Product Data sheets shall be PDF files grouped as shown in 2.01/D
   2. The Contractor shall highlight the actual part number on the sheet of the component that they are submitting.
   3. If no part number is highlighted or marked with an arrow, then the entire submittal package will be rejected and sent back for re-submission.

C. The Contractor shall provide 1 set of PDF of Shop Drawings.
   1. Shop drawings shall be marked for the specification section of the bid documents to which they pertain. Mark the Detail (TCXXX/Y) to which the Shop Drawing refers.
   2. All shop drawings that are required to be drawn on the building background shall be provided on full-size drawings the same scale as those in the bid documents.
   3. All lines on the shop drawings shall be highlighted or completed in ink that is not the same color as that provided in the bid documents.

4. The contractor shall provide a drawing legend detailing all symbols used in creation of the shop drawings.

D. The Contractor shall provide one of each product sample required to be submitted.
   1. Provide a cutsheet with each product sample detailing the specifics of the product and what it is proposed to be used for.

2.05 SUBMITTAL REQUIREMENTS

A. Submittals shall be provided for approval prior to installation of the work.
B. Any equipment installed that does not have an approved submittal associated with it can and will be removed from the project and replaced with other equipment as defined by the Designer. All replacement costs shall be the responsibility of the Contractor.
C. It shall be the responsibility of the Contractor to provide the submittals for review in sufficient time to not delay the installation. Work with the Construction manager on the schedule.
D. It shall be the responsibility of the contractor to ensure they have provided and have on hand “Reviewed” or “Furnish as Corrected” submittals for all equipment they install.
E. When reviewing submittals marked “Furnish as Corrected” take into account the comments and incorporate the comments into the products and installation of the systems.

PART 3 - AS-BUILT DOCUMENTATION

3.01 MATERIALS

A. The Contractor shall provide the following to the Designer prior to the issuance of the final payment.
   1. Approved submittals and equipment user manuals.
   2. As-Built Documentation as detailed below.
   3. All spare parts and cover plates for all components of the systems
   4. Manufacturer warranty cards for all components.

3.02 AS-BUILT PROCESS

A. The Contractor shall provide all project as-builts to the designer at substantial completion.
   1. Provide them to the designer for review
   2. Make any required changes the designer requests
   3. Re-submit at the time of Final Completion / final payment. Final Payment is not possible without a complete post installation deliverable package

3.03 PREPARATION

A. All documents for As-Builts and test results shall be neat and clearly labeled with listing of the project and documents included in each binder.
B. Quantity:
   1. Submit Red Lined, As-Built floorplans for the Systems detailed in 3.04/D.
      a. Provide one set of physical documents, full size,
      b. Provide PDF Scans of the As Built Floorplans.
   2. Submit Electronic files for As-Built Documentation
      a. Provide PDF Files. Provide a Coversheet that details:

A) Client name.
B) Project name.
C) Manual title (e.g., “Project Close-out Manual for security system upgrade”).
D) Date; date format: <month> <day>, <year> (e.g., “January 1, 20xx”).
E) Installer and General Contractor names and contact information
F) Warranty contacts for all systems.

b. Submit Electronic files to Owner, Designer and Construction Manager via email or dropbox or directly through USB Drives.

3.04 PROJECT DELIVERABLES

A. Provide a copy of all submittals and manuals and pamphlets.
B. Provide a copy of all Warranty documents and contact numbers for Warranty requests.
C. The contractor shall provide one set of full sized as-built prints. Provide a PDF of the as-built prints on the USB drives or via Email or Dropbox.
   1. Provide a clean set of the latest drawings with red lines marked for all field changes or bulletins. See above for systems to be included on the As-Built prints
D. The As-Built drawings shall include:
   1. Changes to be reflected on the drawings for Video Security Systems shall include:
      a. Camera locations
      b. Cabling Paths
      c. Camera numbers
      d. Comm room where camera connects to.
   2. Changes to be reflected on the drawings for Access Control/Alarm Systems shall include:
      a. Changes to hardware installed at each door. Update each door for all devices installed and connected
      b. Changes to the panel locations
      c. Door numbers
      d. Changes to the schematic connectivity of any system shown on the drawings.
   3. Changes to be reflected on the drawings for Audio and Video Systems shall include:
      a. Microphone/speaker faceplate locations and labels.
      b. Rack/cabinet locations.
      c. Speaker and microphone locations.
      d. Rack layout of all components in each rack.
      e. Changes to the schematic connectivity of any system shown on the drawings.
      f. Ceiling/wall mounted projector locations
      g. Label designation of all cables, including system interconnection cables.
   4. Changes to be reflected on the drawings for Cabling Systems shall include:
      a. Route of exterior conduits and exterior cabling
      b. Route of backbone cabling, fiber and copper
      c. Route of major cable paths from outlet to comm room.
      d. Rack/cabinet locations.
      e. Faceplate locations

f. Rack layout of all components in each rack.
g. Changes to the schematic connectivity of any system shown on the drawings.
h. Cable numbering for each faceplate.

5. Changes to be reflected on the drawings for Paging and Clock System shall include:
   a. Clock Locations
   b. Microphone and audio input faceplate locations and labels.
   c. Rack/cabinet locations.
   d. Speaker locations and associated zone information for each speaker
   e. Primary cable routing paths
   f. Call button locations
   g. Label designation of all cables, including system interconnection cables.

E. Documentation for the specific systems shall include. Provide the following for each system:
   1. Contractor warranty dates based on Substantial completion date and contact information for warranty work.
   2. Data cabling
      a. Testing Documentation for copper and fiber cabling
         A) Include software to read the test results.
         B) Testing Documentation; This shall include actual cable test results. Tabbed Sections in the binder:
            1) Telecommunication Horizontal Cabling Detailed cable test reports
            2) Telecommunications Fiber backbone cabling
            3) Summary report
      b. Signed Cabling Warranty from manufacturer
   3. Video Security
      a. Picture of focused and approved camera image labeled with the camera number and IP address
      b. Master user password list
      c. Spreadsheet of each camera that shall include:
         A) Camera Part number
         B) Firmware revision
         C) IP address
         D) MAC Address
         E) Camera Name
         F) Building where it is located
      d. Training “Cheat Sheet”
      e. Manufacturers Camera Warranty
      f. Server/NVR Warranty
      g. Manufacturer contact information for warranty work
      h. Software Upgrade Protection (SUP) warranty including end date
      i. Warranty certificate for all PC’s
   4. Access Control
      a. Part list/diagram for each access control panel. To include
         A) Panel name and IP address (if applicable)
         B) Doors which are connected to this panel
         C) Panel location. Building and room number
      b. Diagram showing which devices and doors that are attached to each panel

c. Training “Cheat Sheet”
d. Server Warranty
e. Software Upgrade Protection (SUP) warranty including end date
f. Warranty certificate for all PC’s

5. Audio / Video Systems
   a. Warranty certificate for LCD Monitors
   b. Warranty certificate for projectors

F. Training sign-in sheets detailing what was trained, who was trained and their time in training.

END OF SECTION 287200

SECTION 287600 – TECHNOLOGY LABELING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This section provides direction on labeling of cables and devices.

PART 2 - PRODUCTS

2.01 CABLE LABELING PRODUCTS INTERIOR

A. CAT- 6, access control and audio / video cabling
   1. Laser-printed, self-adhesive wrap around shall be Brady LAT-18-361 or equivalent.
   2. Label shall be 1.00-inch width x 1.33 inch high.
   3. Labels shall come on a sheet with 7 labels per row with a white and transparent matte finish.
   4. Sheet size shall be 8-1/2-inch x 11 inch.
   5. Printable area shall be a minimum of 1.00-inch width x 0.50 inch high.
   6. All labels shall be printed through a laser printer using labeling software.
   7. The Contractor shall submit a proposal for the labeling scheme for all audio and video wiring. The Engineer shall approve of the scheme prior to all labeling.

B. Audio and Video Components in a cabinet or rack or teacher desk/.lectern.
   1. Each of the audio and video components shall be labeled.
   2. The labels shall have a white background with black, laser printed letters.
   3. Each label shall be large enough for 2 lines of text and wide enough to detail what each dial and component is for.
   4. Each input and output control point on the amplifiers and other equipment shall be labeled for the device to which it connects.
   5. Mark each volume or level control for the optimum setting.
      a. Put a mark at the nominal input and output level for each control. This shall be useful for a new person to reset the system to work as designed if someone else has changed the settings.

C. Faceplate Labels
   1. Laser-printed, paper labels shall be used to label user faceplates.
   2. Individual paper labels shall be installed behind the clear plastic strips of all user faceplates and surface mount housings.
      a. The labels shall show the location identifier number and letter of each individual cable.
   3. Where a faceplate or surface mount box does not have a clear plastic strip the contractor shall install an adhesive label on the plate or surface mount box showing the cable number of each cable in the plate.

D. CAT-6 patch panels in comm rooms
   1. Laser-printed, labels shall be used to label Cat-6 Patch panels
   2. Label the side of the patch panel for the panel number in the comm room. “Panel A” etc. label on two spot on each panel

3. The panels shall be labeled 1-24. Use factory numbering or paper numbering if no factory numbering is provided.

E. Rack and Cabinet labels
1. Provide and install Engraved, lamacoid labels at the top of each rack or cabinet installed. Shall be black label with white engraved letters
2. Shall be 1” high minimum.
3. Coordinate rack number and comm room number prior to ordering

F. Custom Faceplates
1. Engraved labels shall be installed at locations including but not limited to:
a. Audio and Video special input plates. Detail each input and output
2. Size the phenolic labels for their individual uses. Provide a sample to the Engineer for approval prior to ordering or installation.

2.02 SECURTY CAMERA LABELING
A. Laser-printed, labels shall be used to label all Security Cameras
1. Label the camera with a White or Clear label with black lettering.
2. Label shall include the camera number.
3. May include the IP address. Consult with owner to determine if this is required
4. Label shall be a minimum of 3/4 inch tall and legible when standing beneath or near the camera as long as camera is not above 15; AFF

2.03 ACCESS CONTROL PANEL LABELING
A. Label the front of each access control panel to detail the doors that are connected to the panel.
1. Label the front panel and detail each door number
2. Label shall include the panel name and IP address
3. Text shall be a minimum of 3/8 inch tall
4. White label with black numbers

PART 3 - EXECUTION

3.01 PREPARATION
A. Terminate all cables in proper color code sequence.
B. Clean any surfaces where an adhesive label is to be installed.
C. Prior to beginning the work, the contractor shall submit to the engineer a plan for labeling all the cables. This shall take into account to what components each cable is connected.

3.02 GENERAL LABELING
A. Everything shall be labeled as per the specs and drawings.
B. All labels shall be installed to more easily identify the cables and ports on all panels. If there are any questions regarding labeling, contact the Engineer prior to installation.
C. Engraved lamacoid labels shall be provided and installed whenever there is no location for paper inserts on faceplates, power poles, poke thru’s, floor boxes, modular furniture and surface raceway.
1. Engraved lamacoid labels shall provide the same labeling as the paper inserts, but they shall be self-adhesive.
2. These labels shall be adhered to the location closest to the modular jack.
3. Individual letters shall be provided for each cable. An overall location identifier can be provided for all the cables at that faceplate or floor box.

4. Engraved labels for rack shall be at least 1-1/2 inch high with letters 1 inch high.
5. These labels shall be affixed to the top and front of each rack or cabinet. Verify that the label will fit the rack or cabinet prior to purchasing.

3.03 DATA CABLING LABELING EXECUTION

A. Cable labels for CAT-6 user cables from the faceplate to the patch panel shall be installed within 4 inches of the end of the cable sheath.

1. The location identifier is made up of 3 fields, and a sample might look like this:

   A-X-YY

   The A stands for the communications room where the cables are terminated.
   The X represents that the Patch panel in that comm. room.
   The YY represents the cables number in that panel 01-48.

   This system of identification provides the Owner with an easy way to keep track of cables, and where they are located or terminated.

2. The cable label shall be similar to the label below:

A-X-YY
A-X-YY
A-X-YY

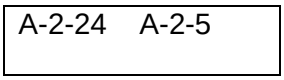
3. Provide a sample label to the Engineer for approval prior to installation of all labels.
4. Labels shall be installed at each end of each cable. Shall be within 4” of the termination.
5. Shall be at a uniform distance from termination on the patch panels. See pic below:



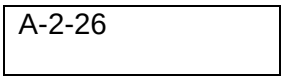
B. Paper inserts shall be supplied for all faceplates and patch panels labels.

1. Paper inserts for the faceplate shall detail the exact location identifier for each cable.

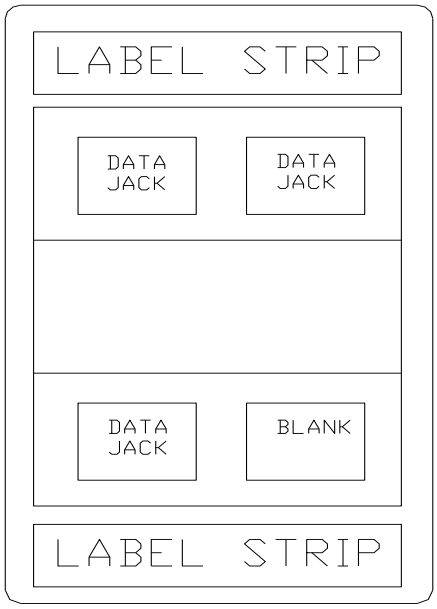
2. They shall fully cover the background of the insert space on the faceplate, but all numbers and letters of the identifier shall be visible after installation of the plastic cover plate.
3. The paper insert for a standard faceplate will look like this:



Top Label Strip



Bottom Label Strip



4. Provide a sample label to the Engineer for approval prior to installation of all labels.

C. CAT-6 Patch panels shall be labeled for the panel they are numbered in the comm room and for the cameras (1-24 or 1-48)
1. See below diagram:
a. Install labels at each end detailing the panel number.

Panel A	01	02	03	04	05	06	07	08	09	10	11	Panel A

D. CAT-6 Patch panels for Wireless Access Points shall be labeled for the WAP number
1. See below diagram:
a. Install labels below each outlet on the patch panel detailing the WAP number

b. Meet with the owner and obtain the WAP number and label the panel with that WAP number. Install .laser printed label

c. Example below shows WAP number of BU (for Butler building)-0XX etc.

Panel A	01	02	03	04	05	06	07	08	09	10	11	Panel A
	BU-021	BU-022	BU-023	BU-024	BU-025	BU-026	BU-027	BU-028	BU-029	BU-030	BU-031	

TYPICAL PANEL LABELING



3.04 VIDEO SECURITY LABELING

A. Cameras shall be labeled with the camera number in a visible location.
   1. Affix a label to the camera housing that details the camera number
   2. Shall be in a location that is visible from a standing position.
   3. Shall be laser printed.
   4. Label the camera cable patch panel to include the number of each camera connected to that cable. This camera cable label at the patch panel shall be by video security contractor
      a. Install an adhesive sticker below the cable in the patch panel as the factory number (1-24) is most likely on top of the panel.

B. Label the CAT-6 Patch Panel for security Cameras in each comm room
   1. Install an adhesive label on each port on the patch panel that attached so the security camera cable.

      DDD = the camera number within that building

C. CAT-6 Patch panels for security cameras shall be labeled for the camera number
   1. See below diagram:

a. Install labels at each end detailing the panel number.

Panel A	01	02	03	04	05	06	07	08	09	10	11	Panel A
	101	102	107	108	201	105	208	145	146	147	174	

D. All labels shall be installed to more easily identify the cables and ports on all panels. If there are any questions regarding labeling, contact the Engineer prior to installation.

3.05 ACCESS CONTROL SECURITY LABELING

A. Security Panels shall be labeled on the outside to indicate panel number and communications room number

Security panel	IP address 111.111.10.112
Panel 04	Comm room XXX

1. Install a label on the inside of the panel that details:
   a. Door numbers that are connected to this panel
   b. Diagram of panel showing where each door is connected to the panel.
   c. Panel name as shown in the access control system
   d. IP address of the panel

B. Access Control cables shall be labeled.
1. The cables at the door devices shall be labeled where they connect to the device at the door
2. The cables at the panels in the communications rooms shall be labeled with the door number
3. Cable labels shall be installed within 3 inches of the end of the cable sheath.
   a. The cable label shall be similar to the label below:

125A-DC
125A-DC
125A-DC

b. Provide a sample label to the Engineer for approval prior to installation of all labels.

125A-DC

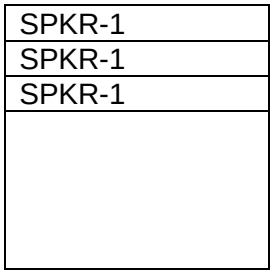
The 125A stands for the Door Number.
The DC stands for Door Contact. This could be any of the field devices:
RX,ES, EL, MX, KP etc.

3.06 AUDIO/VIDEO LABELING

A. The Contractor shall make up a spreadsheet listing each audio and video cable that extends from the cabinet/rack to a location within the building.

1. The spreadsheet shall detail the number of the cable, the room it is located in, and the cabinet to which it routes.
2. One line on the sheet shall show the results of the test. After being tested for continuity, and being tested that the cable delivers the required signal, the Contractor shall enter “PASS” into the result column.
3. There shall be spaces for the name of the person doing the test, the date, and the company name.
4. All information on the sheet shall be printed by a printer except the name of the person performing the tests, the date, and the “PASS” column.
5. This spreadsheet shall be submitted to the Engineer and Owner prior to project completion.

B. Each control, audio, video, speaker, and microphone cable shall be labeled with a self-laminating, laser printed label at each end. This includes all interconnection cables.
1. The cables shall be labeled for the equipment that the cable connects Consult with the Engineer prior to labeling.
2. All speaker cables shall be marked according to their location in each room. Consult with the Engineer prior to labeling.
3. Each video cable shall be labeled according to the equipment it connects to.
4. The cable label shall be similar to the label below:



a. The above label details that this cable is the first speaker cable for the audio system. The same rationale will be used for speakers, video cables, etc. The Contractor shall mark all as-built drawings to show the microphone location or speaker that the label refers to. There shall be continuity between all labels and as-built prints.
b. Provide a sample label to the Engineer for approval prior to installation of all labels.

C. Once the system is set up and running, many different people will be using the system. The Contractor shall label each audio and video component for what it does.
1. In example, the mixers shall detail what microphones they mix. Do this by labeling each gain control dial on the mixer. The mixer would be labeled as “Microphone-Mixer in Incident room” or other similar label.
2. For the description of all the components, consult with the Engineer. All labels shall be laser printed.
3. The Contractor shall identify each item on the as-built connectivity drawings. Use the same identification as you do on the labels.

END OF SECTION 287600

SECTION 287700 – TECHNOLOGY TESTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This section provides direction on
   1. Testing of copper and fiber cable,
   2. Testing and commissioning of the technology systems

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved vendors for cable testers are:
   1. Fluke or equal

2.02 TESTING PRODUCTS

A. Category 6 cable shall be tested.
   1. Cable tester shall support Cat 6 channel and permanent link certification.
   2. Tester shall provide accuracy beyond TIA level III requirements traceable to laboratory reference standards.
   3. Through add on fiber optic probes, the tester shall be able to test multimode and single mode fiber cable.
   4. Test results shall be able to be stored on internal or removable compact flash memory cards.
   5. Tester shall have optional talk set for discussions over the cable being tested.
   6. Tester shall support a frequency range of 1-350 MHz with accuracy to the current proposed TIA Level III.
   7. Tester shall support the following tests:
      a. Near end crosstalk (NEXT).
      b. Attenuation.
      c. Equal level far end crosstalk (ELFEXT).
      d. Return loss.
      e. Ambiant noise.
      f. Wire map shall identify miswires, shorts, opens, reversals, and split pairs.
      g. Shall measure cable length and distance to faults (if any).
      h. Propagation delay.
      i. Loop resistance.
   8. Tester shall support the following test standards:
      a. TIA Cat 6 and ISO Class E.
      b. TIA Cat 5.
      c. TIA TSB-95.
      d. TIA Cat 3, 4 and 5 per TIA TSB-67.
      e. UTP, STP, SCTP coaxial and twinax cabling.
      f. IEEE: all Ethernet 802.3UTP and fiber PMD interfaces including 1000BASE-T; other 802.x PMD interfaces including token ring and demand priority.

g. ATM: All UTP and fiber PMD interfaces.

9. Tester shall have all required probes and accessories required to perform CAT-6 tests and “Network Tests.”
10. Tester shall have been recently calibrated (within 4 months) and shall be utilizing the latest software.

2.03 PUNCHLIST PROCESS

A. The contractor shall be required to go through a punchlist process prior to substantial completion and final completion/payment of each project
B. Contractor shall be responsible for reviewing their own work and checking to ensure it has met the project requirements.
C. The contractor shall:
   1. Review your work in each room
   2. Review the specifications and drawing and review their work to ensure it meets requirements
   3. Create a punchlist document showing what work is not yet done and what as-builts are yet to be completed. Send document to designer.
      a. Provide a date when contractor punchlist work will be completed.
   4. Schedule a punchlist and substantial completion meeting with designer.
   5. Present updated punchlist document to the owner
   6. Walk the site with the contractor and demonstrate all systems and review the work completed. Demonstrate how all work is completed
D. Designer will create an “Owner Punchlist” document
   1. This will be provided to the contractor
   2. Contractor shall review the list, fix/upgrade/replace all equipment and cabling and finish work on the punchlist
   3. Return punchlist to the designer showing when the work was fixed/completed and a signature on the sheet showing that the contractor has reviewed each item.
E. Meet onsite with the designer to review the finished work.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Testing shall be completed after fiber is installed inside the fiber patch panel and the fiber panel has been put together.
B. All cables and panels where cables terminate shall be labeled with the cable label or name of each individual cable. Identify how each cable and panel will be labeled.

3.02 CATEGORY UTP/STP CABLE TESTING

A. Cable tests for CAT 6 cables shall be provided for each user CAT-6 cable.
   1. Prior to beginning the testing, the Contractor shall provide the Engineer with a notice that testing will begin. Written notice shall be given at least 3 business days prior to testing beginning.
   2. Tester shall be calibrated each day with manufacturer provided calibration cable.
   3. Tests shall be saved under each cables unique location identifier.
   4. Contractor shall provide the correct cables and probes specifically for the cable and modular jacks that are being tested.

5. During the test the tester shall be set to check all “Network Tests.”
6. Test results shall be provided in hard copy and soft copy. Along with the soft copy, provide a copy of the software required to read the test results.
7. Contractor shall supply 2 copies of the paper results and 2 copies of the file results.
8. Provide all paper results in 3-ring binders. Binders shall have a cover that shows the job name, job number, building and closet where the cables were tested, and the range in the location identifiers of the cables tests provided.
9. Tester shall be set to match the cable being tested.
10. Contractor is responsible for ensuring that all cables pass the tests. Any cable found not to pass shall be removed and replaced at the Contractor’s expense.

3.03 SECURITY SYSTEM COMMISSIONING

A. After all Work is completed, and prior to requesting the Acceptance test, Contractor shall conduct a final inspection, and pre-test all equipment and system features. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.

B. Contractor shall submit a request for the Acceptance test in writing to the owner no less than fourteen days prior to the requested test date. The request for Acceptance test shall be accompanied by a certification from Contractor that all Work is complete and has been pre-tested, and that all corrections have been made.

C. During Acceptance test, Contractor shall demonstrate all equipment and system features to the owner. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the owner.

D. If the contractor has submitted all necessary paperwork and the system seems to be in working order according to the engineer then the system can be considered Substantially Complete after the engineer puts that in writing.

E. Security System Substantial Completion.
   1. The access control system shall be considered substantially complete as soon as:
      a. All doors are connected, configured in the system and are working as required.
      b. All security devices are connected and have been tested and shown to be fully functional. All cables are labeled at each end.
      c. Intercoms are functioning and able to release lock on a door.
      d. All users are entered into the system and all cards/fobs have been distributed.
      e. All locking and unlocking schedules are defined and are working.
      f. User accounts are setup
      g. As-built drawings have been updated to reflect any changes in the connectivity.
      h. All manufacturer literature has been turned over to the Owner.
      i. Maps are setup and populated in the system.
      j. Training has been completed.
      k. Copy of the system configuration has been provided to the owner via a CD or thumb drive.
   2. The video security system shall be considered substantially complete as soon as:
      a. All cameras are connected and functional.
      b. The system is fully configured and recording images as required.

c. User accounts are setup
d. As-built drawings have been updated to reflect any changes in the connectivity.
e. All manufacturer literature has been turned over to the Owner.
f. Maps are setup and populated in the system.
g. Training has been completed.

3. The contractor shall schedule a substantial completion meeting where all security systems shall be demonstrated and shown to be in working order and configured as per the specs and the owner's requirements.
   a. If the system is deemed to be in working order then the engineer shall sign a letter stating that the systems are Substantially Complete. The system is not Substantially Complete until a letter is provided to the contractor and owner.
4. After substantial completion the systems shall be in good working order for a period of 30 days.
   a. In the event that the system or systems should fail or not work as required during the 30-day period, the Contractor shall be on site the same day to fix and configure the system to make it work as designed.
   b. A new 30-day period will begin as soon as the system has been demonstrated to be in good working order and the engineer acknowledges in writing that the system has been fixed and is again considered substantially complete.
5. Once the system has been considered Substantially Complete and has been working for 30 consecutive days with no interruption in service, the system shall be thought of as "Finally Complete."
6. Warranty shall begin immediately after the system is deemed Finally Complete.

3.04 AUDIO SYSTEMS COMMISSIONING

A. Audio/ System Testing
   1. Notice of at least 1 week shall be given by the Contractor to the Engineer and Owner prior to the demonstration of all the audio and video components.
   2. The Contractor shall provide a check off sheet of all the audio/video systems that will be demonstrated.
   3. The audio check off sheet shall include:
      a. Listing of all specialty audio system in different rooms throughout the building.
      b. There shall be space for the Engineer and Owner to check off that each feature has been demonstrated and has been shown to work. Additional space shall be provided at the bottom to note items that do not work or need to be fine-tuned.
   4. For each system demonstrated, the Contractor shall show that each input is seen/heard through the output as required.
      a. Show that volume controls for each system actually do control the volume.
      b. Identify each piece of equipment and show the Owner its use.
   5. The check off sheets shall be provided to the Engineer prior to the day of the meeting for review. Any changes required by the Engineer shall be made before the sheet is handed out at the check off meeting.
   6. Prior to the check off meeting, all the as-built drawings shall be updated with the latest field data. The as-built drawings shall be used to verify connectivity of all components. The Contractor shall also verify that all cable locations and audio/video components are connected as per the drawings.
      a. As-built drawings shall be available at the check off meeting for review by the Owner and Engineer.

7. As part of the as-built drawings, the Contractor shall provide a printed spreadsheet listing all the video and audio cables that route from a video or audio cabinet to a user location or display unit.
    a. The spreadsheet shall list the cable, the room it terminates in, and its identifying number. Refer to the testing specifications for further details.

B. Audio System Substantial Completion.
1. The Audio/Video system shall be considered substantially complete as soon as:
    a. All systems have been shown to be connected and work as required
    b. All labeling is installed and systems are balanced.
    c. As-built drawings have been updated to reflect any changes in the connectivity.
    d. All manufacturer literature has been turned over to the Owner.
    e. Training has been completed.
2. The contractor shall schedule a substantial completion meeting where all AV systems shall be demonstrated and shown to be in working order and configured as per the specs and the owner’s requirements.

END OF SECTION 287700

SECTION 287750 – TECHNOLOGY TRAINING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes directions for the Contractor regarding training for technology and security systems.

1.02 SYSTEM DESCRIPTION

A. The Contractor shall provide training on all the installed systems.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 GENERAL TRAINING REQUIREMENTS

A. The Contractor shall provide training on all systems installed or upgraded as part of the contract.
   1. The Contractor shall involve the personnel from the Owner's office in the implementation and configuration of the systems.
   2. Prior to the cutover of the system, the Contractor shall work with the Owner on the training that will be provided. The Owner and the Contractor shall schedule the training at a time beneficial to both.
   3. Each system is to have training provided as part of the installation.
   4. Each training session shall include.
      a. This training will give an overview of the capabilities of each system, and the methods to be employed in utilizing the system.
      b. The Contractor shall provide a syllabus detailing what will be discussed at the training, and notes for the Owner to refer to during the life of the system. The notes shall list directions for general use of the system and possible fixes to general issues that could occur.
      c. Training shall include as-built diagrams of the connectivity, a walk-thru of the system, a demonstration of actual user interface with the system, and directions on its general use.
      d. This training is only meant to give an overview of each system. In depth training shall be provided for an in-depth analysis of certain systems as described below.
   5. For all training, the Contractor shall pay all expenses.

B. Create cheat sheets for all systems that the users can keep after the training.
   1. Cheat sheet shall include details on how to use the system.
   2. A copy of the cheat sheet shall be laminated and installed at the system location.
   3. For individual training the contractor shall provide a cheat sheet for each person being trained.

4. Cheat sheet shall be laminated.
5. Provide a cheat sheet in each classroom or conference room.
6. Submit these for approval to the designer and owner prior to training. Have the cheat sheets at the training.

3.02 AUDIO/ SYSTEM TRAINING

A. Training on the audio systems shall be as follows:
   1. Provide training on each type of System installed.
   2. Contractor shall provide a 2-hour in depth training class on the connectivity and use of each type of audio and or audio/video system.
   3. Training class shall be on-site utilizing the actual equipment installed as part of the system.
   4. The class shall be open to 6 of the Owner's Representatives.
   5. The Contractor shall provide handouts at the meeting detailing all aspects of the use of the system. It shall include directions on how to best utilize all components, as well as a checklist of items to go through if something is not working properly.
   6. The Owner and Contractor shall meet and decide on the syllabus prior to training.
   7. Generate a laminated sheet detailing the sequence and how to use each system in each room. Leave that behind in the room. Provide extra paper copies to the owner.

END OF SECTION 287750

SECTION 287800 – TECHNOLOGY WARRANTY

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. This section includes directions for the Contractor regarding system and equipment warranties.

1.02 SYSTEM DESCRIPTION
A. The project is not complete until all paperwork has been provided.

1.03 COORDINATION
A. Coordinate as-built drawings and records with the Engineer and Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Provide manufacturer’s warranty for all equipment installed
B. Provide contractor warranty for workmanship and equipment
C. Provide software upgrade protection (SUP) warranty as detailed in the specifications.

2.02 MATERIALS
A. The Contractor shall provide the following to the owner/designer at Substantial Completion and any updates prior to the issuance of the final payment
   1. Manuals and pamphlets on all electronic equipment.
   2. All spare parts and cover plates for all components of the network.
   3. Red lined set of as-built drawings for the entire project.
B. Updated hard copy and soft copy of the As-Built Documentation. See associated spec section.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Contractor shall fully examine all components of the system to make sure that all manuals and paperwork are included in the final submittal.
B. Examine all equipment and cabling to ensure that it is labeled as per the drawings and specifications.

3.02 GENERAL WARRANTY
A. Warranty Period shall be 1 year after a signed copy of Substantial Completion. This shall be the Warranty Period.
B. See further specifications for additional warranty requirements that may be longer for certain systems.

1. Contractor shall be responsible for generating and submitting the Substantial Completion document to the designer for review and signature.

C. Warranty shall include each and every part, cable or software system provided as part of this project. This includes cabling, Networking, Wireless, Audio/Video systems and Access Control and Video Security systems.
   1. During the Warranty Period:
      a. If any part is broken due to a manufacturing defect or installation defect, the Contractor shall fix and/or replace the broken item at their own expense.
      b. If any equipment loses connectivity or fails for any reason the contractor shall be onsite to diagnose and fix or replace equipment and upgrades software.
      c. The Contractor shall also supply all configuration and programming necessary to keep all electronic equipment to the latest revision of software during the warranty period.
      d. If the “system” goes down, and needs configuration to be brought back up, the Contractor shall be liable for any programming or reconfiguration.
      e. During the warranty period, the Contractor shall make the Owner aware of any software upgrades that are available.
      f. Contractor shall install all software upgrades for that warranty period or as detailed below for specific systems.
      g. If the system does not run well during the warranty period the contractor shall be onsite to diagnose and fix the system.

D. The contractor shall be onsite within 24 hours after a call from the owner or designer regarding system or equipment issues.

3.03 EXTENDED CABLING WARRANTY

A. The Contractor shall provide to the Owner a “Link Warranty” on all the components of the voice/data cabling system. This includes all components from the faceplate, through the jacks, cable, and back to the patch panels, not including patch cords. This does include Fiber Optic cabling and termination equipment.

B. Cable shall be installed that is covered as part of the complete warranty on the data cabling system. Cable that cannot be covered under the warranty shall not be installed.

C. The warranty shall be provided through the manufacturer of the faceplate, jacks, and patch panels. All components shall be by the same manufacturer.

D. The warranty shall guarantee that if any part or piece of the “Link” is found to be defective for a period of no less than 15 years, then that part or piece shall be replaced or fixed at no cost to the Owner.

E. The Contractor shall be responsible for installing the system in such a manner that the manufacturer will provide this warranty to the Owner.

F. The Contractor is responsible for compiling and submitting all the paperwork required to receive the warranty. This includes gathering all the information, completing any required forms, and submitting these forms and any other records to the manufacturer as required.

G. It shall be the Contractor’s responsibility to receive the approved warranty notification from the manufacturer and provide that and all the associated paperwork to the Owner.

H. The installation shall not be considered finally complete until the Owner has received notification, from the manufacturer, that the entire cabling system is covered by their warranty

3.04 CAMERA WARRANTY

A. All cameras shall be warranteed by the manufacturer for 5 years.
B. If camera fails during general warranty period then the contractor shall be onsite and replace camera with a new model. Install replacement camera.
C. After general warranty period the manufacturer shall replace or repair the camera if it fails.

3.05 VIDEO SECURITY SOFTWARE WARRANTY

A. As part of the project the contractor shall provide a three-year (3) video security recording system and security camera warranty that provides for all software updates during the years after Substantial Completion.
    1. Contractor shall be required to install all software and firmware updates during the three years.

3.06 ACCESS CONTROL SOFTWARE WARRANTY

A. As part of the project the contractor shall provide a three-year (3) access control system software warranty that provides for all software updates during the years after Substantial Completion.
    1. Contractor shall be required to install all software and firmware updates during the three years.

END OF SECTION 287800



BERGMANN
ARCHITECTS ENGINEERS PLANNERS

560 5th St. NW // Suite 305 // Grand Rapids, MI 49504
616.827.4270

www.bergmannpc.com

Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

9/18/2023

PROJECT CONTACT LIST

OWNER:
- LANSING SCHOOL DISTRICT
- 519 W KALAMAZOO
  LANSING, MI 48933
- CONTACT: TODD COE
- PHONE: 517-755-3818

ARCHITECT:
- BERGMANN
- 560 5TH STREET NW, SUITE 305
  GRAND RAPIDS, MI 49504
- CONTACT: BUDDY HUYLER
- PHONE: 616-848-6969

CONTRACTOR:
- LAUX CONSTRUCTION
- 1018 HOGSBACK RD
  MASON, MI 48854
- CONTACT: BRIAN STIEBE
- PHONE: 517-525-1456

PROJECT LOCATION MAP


SITE LOCATION
Attwood Elementary School
Plumbers Apprentice
Antioch Church
Brighter Horizons Assisted Living Center
Trinity Lutheran Church
Mel Ave
Jerry's Restaurant
Dominion Energy Service
Logan Road
W Northrup St
Wyoming Ave
Dollar General
Meijer
Wyndmere Ct
Attwood Ct
Sharon Ct
Ashley
Kingsley Ct
Bradford Ct
Bradford Dr
Bradford Rd
Bradford Ave
Bradford Pl
Bradford Cir
Rosemont Ave
Rosemont Pl
Rosemont Cir
Rosemont Ct
Rosemont Dr
Rosemont Rd
Rosemont Ln
Rosemont Way
Rosemont Blvd
Rosemont Trl
Rosemont Pkwy
Rosemont Sq
Rosemont Ter
Rosemont Path
Rosemont Loop
Rosemont Crossing
Rosemont Circle
Rosemont Court
Rosemont Drive
Rosemont Road
Rosemont Street
Rosemont Avenue
Rosemont Place
Rosemont Boulevard
Rosemont Parkway
Rosemont Square
Rosemont Terrace
Rosemont Pathway

ARCH D 24x36

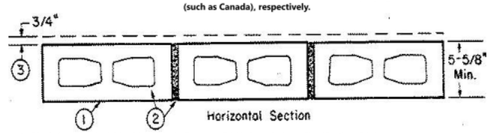
FIRE WALL INFORMATION

Design No. **U906**

April 14, 2023

Bearing Wall Rating — 2 HR.
Nonbearing Wall Rating — 2 HR.
This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Concrete Blocks* —** Nominal 6 by 8 by 16 in, hollow or solid. Various designs. Classification (2 hr).

See **Concrete Blocks** category for list of eligible manufacturers.

ANCHOR CONCRETE PRODUCTS INC

GAGNE & SON CONCRETE BLOCK INC

GLENWOOD MASONRY PRODUCTS

Allowable compressive stress of 57% of max allowable compressive stress in accordance with the empirical design method.

OLDCASTLE APG SOUTH INC, DBA ADAMS PRODUCTS

WESTBROOK CONCRETE BLOCK CO INC

Allowable compressive stress of 75.6% of max allowable compressive stress in accordance with the empirical design method.

2. **Mortar —** Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster —** Add 1/2 hr to Classification if used. Attached to concrete blocks (Item 1).

4. **Foamed Plastic* —** (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).
ATLAS ROOFING CORP — EnergyShield Pro Wall Insulation, EnergyShield Pro 2 Wall Insulation, EnergyShield CGF Pro, EnergyShield Ply Pro, EnergyShield® CGF, EnergyShield® PanelCast, EnergyShield® and "EnergyShield® XR

DUPONT DE NEMOURS, INC. — Types Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP), TUFF-R™ ci Insulation, Thermax Butler Stylwall Insulation Board and Thermax Morton Heavy Duty Insulation Board

FIRESTONE BUILDING PRODUCTS CO L L C — "Enverge™ CI Foil Exterior Wall Insulation" and "Enverge™ CI Glass Exterior Wall Insulation"

HUNTER PANELS, A DIVISION OF CARLISLE CONSTRUCTION MATERIALS, LLC — Types "Xci-Class A", "Xci 286", "Xci Foil (Class A)"

RMAX, A BUSINESS UNIT OF SIKA CORPORATION — Types "TSX-8500", "ECOMAXci FR", "TSX-8510", "ECOMAX xi FR White", "ECOMAXci", "ECOMAXci FR Air Barrier", "Thermasheath-XP", "Thermasheath", "Durasheath"

JOHNS MANVILLE — Type "AP Foil-Faced Foam Sheathing"

4A. **Building Units* —** As an alternate to Item 4, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

ATLAS ROOFING CORP — EnergyShield® Ply

RMAX, A BUSINESS UNIT OF SIKA CORPORATION — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI", "ECOMAXci FR Ply", "ECOMAXci Ply"

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

EXISTING WALL FIRE RATINGS PER MBC 722

RATING PROVIDED BY EXISTING 12" CMU WALLS PER TABLE 722.3.2

EQUIVALENT THICKNESS OF EXISTING 12" CMU WALLS:
TOTAL AREA OF 12" CMU = 1.26 SQ FT
CROSS SECTIONAL MATERIAL AREA = .46 SQ FT
PERCENTAGE OF TOTAL AREA FILLED WITH MATERIAL = .46/1.26 = .365 OR 35.6%
EQUIVALENT THICKNESS = 35.6% OF 11 5/8" OR 4.24"

REQUIRED EQUIVALENT THICKNESS OF EXISTING 12" CMU WALLS FOR A 2-HOUR RATING = 4.2" (BASED ON CALCAREOUS OR SILICEOUS GRAVEL WHICH IS THE WORST CASE SCENARIO)

RATING PROVIDED BY EXISTING 8" CMU + BRICK WALLS PER TABLE 722.3.2

EQUIVALENT THICKNESS OF EXISTING 8" CMU WALLS:
TOTAL AREA OF 8" CMU = .83 SQ FT
CROSS SECTIONAL MATERIAL AREA = .38 SQ FT
PERCENTAGE OF TOTAL AREA FILLED WITH MATERIAL = .38/.83 = .458 OR 45.8%
EQUIVALENT THICKNESS = 35.6% OF 7 5/8" OR 3.49"
CMU RATING (WORST CASE CONDITION, CALCAREOUS OR SILICEOUS GRAVEL) LINEAR INTERPOLATION OF 3.49" = 1.43HRS, 1.43HRS EXPONENT .59 = 1.23HRS

RATING OF BRICK MASONRY (WORST CASE CONDITION, HOLLOW BRICK OR SHALE GROUTED) LINEAR INTERPOLATION OF 3.625" = 1.45HRS, 1.45HRS EXPONENT .59 = 1.24HRS

NO AIR SPACE

1.23HRS + 1.24HRS = 2.47 HRS

RATING PROVIDED BY EXISTING 4" CMU + BRICK WALLS PER TABLE 722.3.2

EQUIVALENT THICKNESS OF EXISTING 4" CMU WALLS:
TOTAL AREA OF 4" CMU = .39 SQ FT
CROSS SECTIONAL MATERIAL AREA = .23 SQ FT
PERCENTAGE OF TOTAL AREA FILLED WITH MATERIAL = .23/.39 = .590 OR 59%
EQUIVALENT THICKNESS = 59% OF 3 5/8" OR 2.14"
CMU RATING (WORST CASE CONDITION, CALCAREOUS OR SILICEOUS GRAVEL) LINEAR INTERPOLATION OF 2.14" = 0.59HRS

RATING OF BRICK MASONRY (SOLID BRICK OF CLAY OR SHALE) LINEAR INTERPOLATION OF 3.625" = 1.84HRS, 1.84HRS EXPONENT .59 = 1.43HRS

NO AIR SPACE

0.59HRS + 1.43HRS = 2.02 HRS

706.5 HORIZONTAL CONTINUITY

FIRE WALLS SHALL BE CONTINUOUS FROM EXTERIOR WALL TO EXTERIOR WALL AND SHALL EXTEND NOT LESS THAN 18 INCHES (457 MM) BEYOND THE EXTERIOR SURFACE OF EXTERIOR WALLS.
EXCEPTIONS:

EXCEPTION 2
FIRE WALLS SHALL BE PERMITTED TO TERMINATE AT THE INTERIOR SURFACE OF NONCOMBUSTIBLE EXTERIOR SHEATHING, EXTERIOR SIDING OR OTHER NONCOMBUSTIBLE EXTERIOR FINISHES PROVIDED THE SHEATHING, SIDING OR OTHER EXTERIOR NONCOMBUSTIBLE FINISH EXTENDS A HORIZONTAL DISTANCE OF NOT LESS THAN 4 FEET (1220 MM) ON BOTH SIDES OF THE FIRE WALL.

706.6 VERTICAL CONTINUITY

FIRE WALLS SHALL EXTEND FROM THE FOUNDATION TO A TERMINATION POINT NOT LESS THAN 30 INCHES (762 MM) ABOVE BOTH ADJACENT ROOFS.
EXCEPTIONS:

WALLS SHALL BE PERMITTED TO TERMINATE AT THE UNDERSIDE OF NONCOMBUSTIBLE ROOF SHEATHING, DECK OR SLABS WHERE BOTH BUILDINGS ARE PROVIDED WITH NOT LESS THAN A CLASS B ROOF COVERING. OPENINGS IN THE ROOF SHALL NOT BE LOCATED WITHIN 4 FEET (1220 MM) OF THE FIRE WALL.

1020.4 DEAD ENDS

EXCEPTION 3:
A DEAD-END CORRIDOR SHALL NOT BE LIMITED IN LENGTH WHERE THE LENGTH OF THE DEAD-END CORRIDOR IS LESS THAN 2.5 TIMES THE LEAST WIDTH OF THE DEAD-END CORRIDOR.

EGRESS LOBBIES A-122 AND A-125 ARE INTENDED AS LOBBIES IN A SEPARATED ADDITION TO THE EXISTING BUILDING, AS OPPOSED TO A CONTINUATION OF THE EXISTING CORRIDORS. HOWEVER, IF THEY ARE TO BE CONSIDERED CORRIDORS, THEY MEET THIS REQUIREMENT/EXCEPTION AND THE INTENT OF THE SAFETY CONSIDERATIONS THEREIN.

APPLICABLE CODE:
COMPLIANCE WITH THE: 2015 MICHIGAN BUILDING, REHABILITATION, MECHANICAL, AND ENERGY CONSERVATION CODES (BASED ON 2015 I-CODES), 2018 PLUMBING CODE (BASED ON 2018 IPC) INCLUDING MICHIGAN ADDENDA AND ERRATA; 2017 NATIONAL ELECTRICAL CODE (NEC) AND 2017 CONSTRUCTION CODE - PART 8 ELECTRICAL CODE RULES; BOILER CODE (2010 ASME BOILER AND PRESSURE VESSEL CODES WITH 2011 ADDENDA); ELEVATOR CODE (2010 ASME 17.1, 2011 ASME A18.1 AND ELEVATOR SAFETY BOARD GENERAL RULES, ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES (ICC A117.1-09), AND OTHER LOCAL, STATE, AND FEDERAL CODES AND REGULATIONS APPLICABLE TO THIS PROJECT.

BUILDING CODE SUMMARY

PROJECT INFORMATION:

PROJECT NAME:	LANSING SCHOOL DISTRICT - ATTWOOD CAFETERIA ADDITION		
PROJECT NUMBER:	23005898A		
PREPARED BY:	D. EBERT	CHECKED BY:	
DATE:	06/01/23	DATE:	

REHABILITATION OF EXISTING STRUCTURES:
PER THE 2015 MICHIGAN RAHABILITATION CODE FOR EXISTING BUILDINGS (2015 EIBC)
☐ REPAIRS (CHAPTER 6)
☐ ALTERATIONS - LEVEL 1 (CHAPTER 7)
☐ ALTERATIONS - LEVEL 2 (CHAPTER 8)
☐ ALTERATIONS - LEVEL 3 (CHAPTER 9)
☐ CHANGE OF OCCUPANCY (CHAPTER 10)
PARTIAL CHANGE OF OCCUPANCY: ☐ YES ☐ NO
☒ ADDITIONS (CHAPTER 11)
SEPARATED ADDITION: ☐ YES ☐ NO
IF YES, FIRE RESISTENCE RATING:
☒ FIRE WALL 2 HR
☐ FIRE BARRIER ____ HR
☐ ACCESSIBILITY UPGRADES: COMPLY WITH SECTION 410 AND ADDENDA

OCCUPANCY CLASSIFICATION AND MIXED OCCUPANCIES: (CHAPTERS 3 & 5)
☒ SINGLE ☐ ACCESSORY - GROUP ; % OF FLOOR AREA
☐ MIXED OCCUPANCY ☐ SEPARATED ☐ NON-SEPARATED ☐ COMBINATION
OCCUPANCY CLASSIFICATION(S): EDUCATION
USES: E

AUTOMATIC SPRINKLER SYSTEM PROVIDED THROUGHOUT BUILDING:
☐ YES ☒ NO
PARTIAL/LIMITED-AREA SPRINKLER SYSTEM:
☐ YES ☒ NO

CONSTRUCTION TYPE: 2B SECTION 601 (CHAPTER 6)
FIRE RESISTANCE OF BUILDING ELEMENTS:

BUILDING ELEMENTS	REQUIRED	PROVIDED	SECTION
STRUCTURAL FRAME	0	0	(TABLE 601)
BEARING WALLS (EXTERIOR)	0	0	(TABLE 601)
BEARING WALLS (INTERIOR)	0	0	(TABLE 601)
NON-BEARING WALLS (EXTERIOR)	0	0	(TABLE 602)
NON-BEARING WALLS (INTERIOR)	0	0	(TABLE 601)
FLOOR CONSTRUCTION	0	0	(TABLE 601)
ROOF CONSTRUCTION	0	0	(TABLE 601)

HEIGHT & AREA - ALLOWABLE: (CHAPTER 5)
PER TABLES 504.3, 504.4 AND 506.2

OCCUPANCY CLASSIFICATION	TABULAR AREA A_t PER FLOOR	TABULAR HEIGHT FEET	TABULAR HEIGHT STORIES
E	25,375 sf	55 ft	2

HEIGHT & AREA - ACTUAL: (CHAPTER 5)

BUILDING HEIGHT	HEIGHT IN FEET	HEIGHT IN STORIES
PROPOSED ADDITION	24' - 0" ft	1

BUILDING AREA SUMMARY		ADDITION	TOTAL
FIRST		6,455 sf	6,455 sf
TOTAL (DOT INCLUD. BASEMENT, IF NOT A STORY ABOVE GRADE)		6,455 sf	6,455 sf

ADDITIONAL FIRE AND SMOKE PROTECTION FEATURES (CHAPTER 7)
☐ EXTERIOR WALLS (SECTIONS 705 & 602): RATING 0 - HR CONTINUITY ____
☐ FIRE WALLS (SECTION 706): RATING 2 - HR CONTINUITY YES

INTERIOR FINISH: (CHAPTER 8)
WALL AND CEILING

OCCUPANCY: FINISH CLASS	LOCATION			
☐ A	☒ EXITS	☐ CORRIDORS/ EXIT ACCESS	☐ ROOMS/ SPACES
☐ B	☐ EXITS	☒ CORRIDORS/ EXIT ACCESS	☐ ROOMS/ SPACES
☐ C	☐ EXITS	☐ CORRIDORS/ EXIT ACCESS	☒ ROOMS/ SPACES

FLOORING

FINISH CLASS	OCCUPANCIES	
☒ I	☒ ALL	☐ GROUPS:
☐ II	☐ ALL	☐ GROUPS:
☐ DOC FF-1	☐ ALL	☐ GROUPS:

FIRE PROTECTION SYSTEMS: (CHAPTER 9)
SIZE AND LOCATION OF FIRE AREAS INDICATED ON CODE COMPLIANCE DRAWING(S)

FIRE PROTECTION SYSTEM	REQUIRED	PROVIDED	SECTION
PORTABLE FIRE EXTINGUISHER	X	X	(906)
FIRE ALARM & DETECTION		X	(907)
EMERGENCY ALARM			(908)
FIRE DEPARTMENT CONNECTIONS			(912)
EMERGENCY RESPONDER SAFETY			(914)
CARBON MONOXIDE DETECTION			(915)

MEANS OF EGRESS EXISTING: (CHAPTER 10)
DESIGN OCCUPANT LOAD SUMMARY

OCCUPANCY	FIRST FLOOR
E	1,255
TOTAL	1,255

MEANS OF EGRESS ELEMENT	REQUIRED	PROVIDED	SECTION
NUMBER OF EXITS	4	4	(1006.3.1)
EXIT ACCESS TRAVEL DISTANCE	200' - 0"	152' - 6"	(TABLE 1017.2)
DEAD-END LIMIT	20' - 0"	0' - 0"	(1020.4)
COMMON PATH OF TRAVEL LIMIT	75' - 0"	75' - 0"	(1006.2.1)
CORRIDOR FIRE-RESIST. RATING	1	1	(TABLE 1020.1)

EGRESS WIDTH

DOORS/OTHER	REQUIRED	PROVIDED	SECTION
FIRST FLOOR	2 X 1,255 OCCUPANTS = 251"	273.6"	(1005.3.2) (1007.1.1)
CORRIDORS FIRST FLOOR	44" MIN	44" MIN	(TABLE 1020.2)

MEANS OF EGRESS: (CHAPTER 10)
DESIGN OCCUPANT LOAD SUMMARY

OCCUPANCY	FIRST FLOOR
E	323
TOTAL	323

MEANS OF EGRESS ELEMENT	REQUIRED	PROVIDED	SECTION
NUMBER OF EXITS	2	2	(1006.3.1)
EXIT ACCESS TRAVEL DISTANCE	200' - 0"	105' - 6"	(TABLE 1017.2)
DEAD-END LIMIT	20' - 0"	20' - 0"	(1020.4)
COMMON PATH OF TRAVEL LIMIT	75' - 0"	75' - 0"	(1006.2.1)
CORRIDOR FIRE-RESIST. RATING	1	1	(TABLE 1020.1)

EGRESS WIDTH

DOORS/OTHER	REQUIRED	PROVIDED	SECTION
FIRST FLOOR	2 X 323 OCCUPANTS = 64.6	136.8	(1005.3.2) (1007.1.1)
CORRIDORS FIRST FLOOR	44" MIN	44" MIN	(TABLE 1020.2)

COMBUSTIBLE MATERIALS ON EXTERIOR WALLS (FOAM PLASTIC INSULATION):
EXTERIOR WALLS OF BUILDING OF ANY HEIGHT (SECTION 2603.5):
☐ FIRE-RESISTANCE-RATED WALLS (SECTION 2603.5.1)
☐ THERMAL BARRIER (SECTION 2603.5.2)
☐ POTENTIAL HEAT (SECTION 2603.5.3)
☐ FLAME SPREAD AND SMOKE DEV-INDEXES (SECTION 2603.5.4)
☐ VERTICAL AND LATERAL FIRE PROPAGATION (SECTION 2603.5.5)
☐ LABEL REQUIRED (SECTION 2603.5.6)
☐ IGNITION (SECTION 2603.5.7)

SPECIAL CODE CONSIDERATIONS:
1. A ROOM OR SPACE USED FOR ASSEMBLY PURPOSES THAT IS ASSOCIATED WITH A GROUP E OCCUPANCY IN NOT CONSIDERED A SEPARATE OCCUPANCY 303.1.3
2.
3.
4.

FIRE APPARATUS ACCESS ROAD (IFC CHAPTER 5)
☐ NON-SPRINKLERED BUILDING - EXTEND TO WITHIN 150' OF ALL PORTIONS OF EXTERIOR WALL AT 1ST STORY (F 503.1.1)
☐ AUTOMATIC SPRINKLER SYSTEM THROUGHOUT - EXTEND TO WITHIN 300' OF ALL PORTIONS OF EXTERIOR WALL AT 1ST STORY (F 503.1.1)
☐ MINIMUM 20' WIDE / 13'-6" VERTICAL CLEARANCE (F 503.2.1)
☐ SURFACE DESIGNED TO SUPPORT FIRE APPARATUS LOADS MAINTAINED FOR ALL-WEATHER DRIVING CAPABILITIES (F 503.2.3)
☐ TURNING RADIUS APPROVED BY THE AUTHORITY HAVING JURISDICTION (F 503.2.4)
☐ DEAD ENDS EXCEEDING 150' PROVIDED WITH TURN AROUND AREA (F 503.2.5)
☐ GRADES WITHIN LIMITS ESTABLISHED BY AUTHORITY HAVING JURISDICTION (F 503.2.7)

CONSTRUCTION SAFETY COMPLIANCE WITH:
☐ CHAPTER 33 SAFE GUARDS DURING CONSTRUCTION OF THE IBC
☐ CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION OF THE IFC

PLUMBING FIXTURE REQUIREMENTS: (MPCCHAPTER 4)

OCCUPANCY CLASSIFICATION	OCCUPANT LOAD	WATER CLOSETS MEN REQUIRED	WATER CLOSETS MEN PROVIDED	WATER CLOSETS WOMEN REQUIRED	WATER CLOSETS WOMEN PROVIDED	URINALS REQUIRED	URINALS PROVIDED	D.F. REQUIRED	D.F. PROVIDED	LAVATORIES MEN REQUIRED	LAVATORIES MEN PROVIDED	LAVATORIES WOMEN REQUIRED	LAVATORIES WOMEN PROVIDED
EDUCATION	1 PER 50	16	13	16	12	0	0	16		16	13	16	12

SEPARATE FACILITIES FOR EACH GENDER REQUIRED? ☒ YES ☐ NO (403.1.1) EXC. #
SEPARATE EMPLOYEE FACILITIES REQUIRED? ☐ YES ☒ NO (403.3) EXC. #
LOCATION OF EMPLOYEE FACILITIES COMPLIES? ☒ YES ☐ NO (403.3) EXC. #
LOCATION OF PUBLIC FACILITIES COMPLIES? ☒ YES ☐ NO (403.3) EXC. #
OTHER PLUMBING FIXTURE REQUIREMENTS?

COMMERCIAL ENERGY CODE - ASHRAE 90.1-2013:

MINIMUM AND PROVIDED VALUES:
ZONE 5A

	REQUIRED	PROVIDED
ROOF	R-30 c.i.	R-40 c.i.
WALLS MASS	R-9.5 c.i.	R-20 c.i.
WALLS STEEL FRAME	R-13+7.5 c.i.	R-12.5 c.i.;U-0.08
WALLS BELOW GRADE	R-7.5 c.i.	R-7.5 c.i.
FLOORS SLAB-ON-GRADE	R-20 c.i. FOR 48"	R-20 c.i. FOR 48"
DOORS:	U-0.50	U-0.50
GLAZING: STOREFRONT	U-0.77	U-0.77

ELECTRICAL AND POWER LIGHTING SYSTEMS (C405)

ADDITIONAL NOTES:
COMPLIANCE:
A. PROVIDE FIRE EXTINGUISHERS IN CONFORMANCE WITH THE INTERNATIONAL FIRE CODE SECTION 906 AND COORDINATE WITH FIRE MARSHAL PRIOR TO INSTALLATION. DO NOT INSTALL FIRE EXTINGUISHERS UNTIL LOCATIONS HAVE BEEN REVIEWED AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
B. OBTAIN ALL REQUIRED PERMITS AND PAYMENT OF PERMIT AND APPLICATION FEES FOR THE WORK.

CERTIFICATIONS:
A. THE ARCHITECTS CERTIFICATION IS ONLY FOR THE WORK SHOWN TO BE DONE. IT DOES NOT CONSTITUTE APPROVAL OF PRE-EXISTING CONDITIONS OR REVIEW OF THOSE CONDITIONS FOR CODE COMPLIANCE.
B. THE ARCHITECTS CERTIFICATION IS FOR COMPLIANCE WITH THE BUILDING CODE OF MICHIGAN AND IT'S VARIOUS REFERENCE STANDARDS, FOR PURPOSES OF OBTAINING A BUILDING PERMIT THROUGH THE AUTHORITY HAVING JURISDICTION AND TO CONVEY CONSTRUCTION REQUIREMENTS FOR THE PROJECT. CERTIFICATION DOES NOT GUARANTEE COMPLIANCE WITH LOCAL CODES THAT MAT APPLY.

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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS

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Designer	Reviewer
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Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

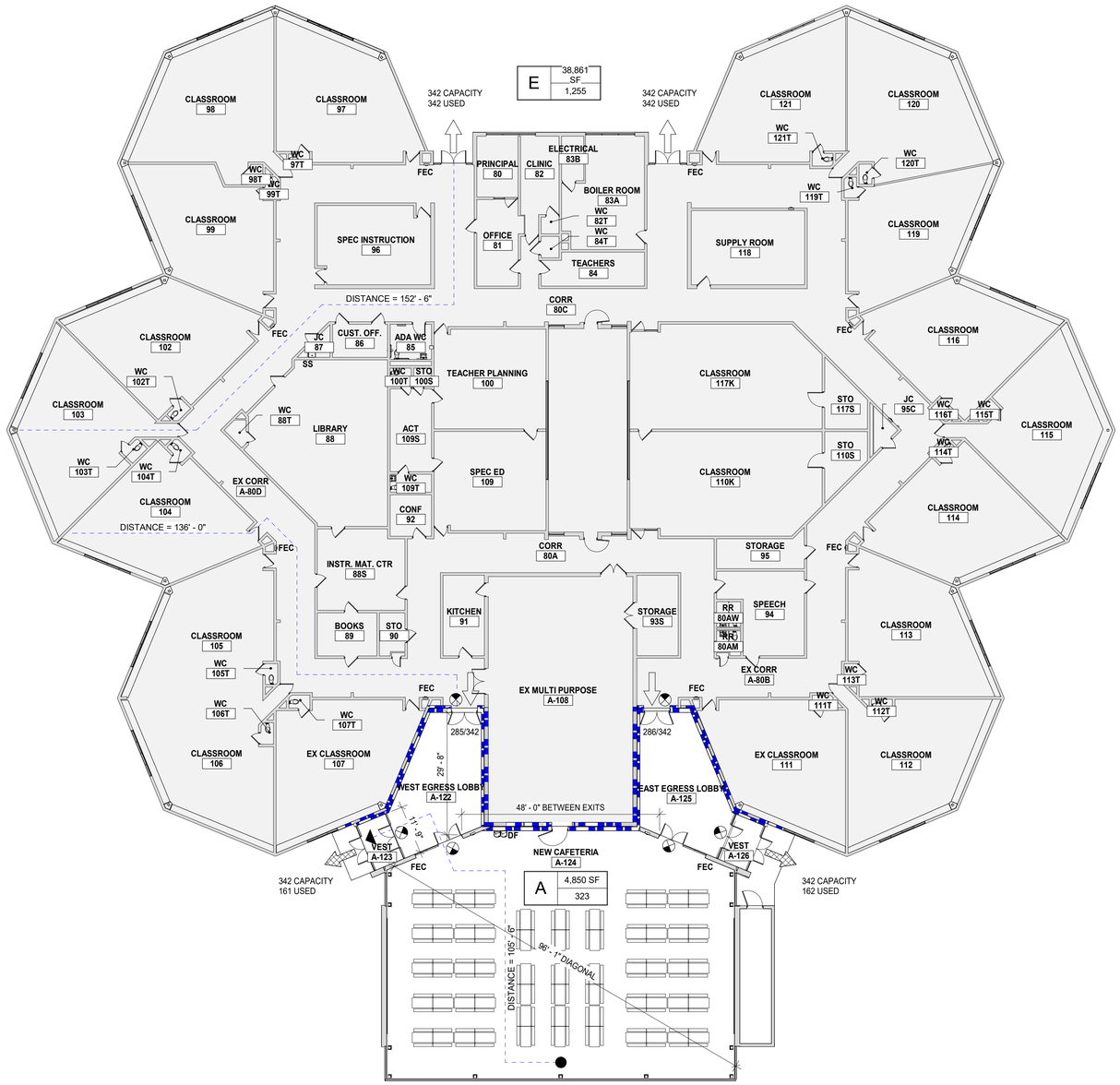
CODE REVIEW

Drawing Number

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1 CODE COMPLIANCE DIAGRAM - FIRST FLOOR
SCALE : 1/16" = 1'-0"

GENERAL NOTES

1. APPLICABLE CODES:
   A. WORK SHALL CONFORM TO FEDERAL, STATE AND LOCAL CODES AS INTERPRETED BY THE AUTHORITY HAVING JURISDICTION.
   B. CONSTRUCTION SHALL CONFORM TO CURRENT EDITIONS OF THE MICHIGAN UNIFORM FIRE PREVENTION AND BUILDING CODE (THE "UNIFORM CODE AND THE MICHIGAN STATE ENERGY CODE"): 2010 AMERICANS WITH DISABILITIES ACT (ADA) STANDARDS FOR ACCESSIBLE DESIGN (28 CFR PART 36, SUBPART D), 2009 ACCESSIBILITY AND USABLE BUILDINGS AND FACILITIES (ICC A117.1-2009), AS WELL AS WITH OTHER LOCAL, STATE AND FEDERAL CODES AND REGULATIONS APPLICABLE TO THIS PROJECT.
2. COMPLIANCE:
   A. PROVIDE FIRE EXTINGUISHERS IN CONFORMANCE WITH THE FIRE CODE SECTION 906 AND COORDINATE WITH FIRE MARSHAL PRIOR TO INSTALLATION. DO NOT INSTALL FIRE EXTINGUISHERS UNTIL LOCATIONS HAVE BEEN REVIEWED AND APPROVED BY THE AUTHORITY HAVING JURISDICTION.
   B. OBTAIN ALL REQUIRED PERMITS AND PAYMENT OF PERMIT AND APPLICATION FEES FOR THE WORK.
3. CERTIFICATIONS:
   A. THE ARCHITECT'S CERTIFICATION IS ONLY FOR THE WORK SHOWN TO BE DONE. IT DOES NOT CONSTITUTE APPROVAL OF PRE-EXISTING CONDITIONS OR REVIEW OF THOSE CONDITIONS FOR CODE COMPLIANCE.
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EXISTING BUILDING

NEW BUILDING

KEYNOTES

LEGEND

OCCUPANCY GROUP
S.F.
OCCUPANTS
1-HR. RATED FLOOR/BEAM/COLUMN TO SUPPORT RATED ELEVATOR SHAFT & MACHINE ROOM ENCLOSURE
SIGN DIRECTION
FACE OF SIGN
EXIT SIGN
HORIZONTAL EXIT
EXIT
CPET — COMMON PATH OF EGRESS DISTANCE
EATD — EXIT ACCESS TRAVEL DISTANCE (ALONG STAIRWAY NOSING AT OPEN STAIRWAYS)
FE — FIRE EXTINGUISHER ON WALL BRACKET
FEC — FIRE EXTINGUISHER CABINET
DF — DRINKING FOUNTAIN
SS — SERVICE SINK
1-HR RATED WALL
2-HR RATED WALL

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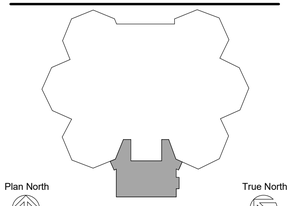
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

CODE COMPLIANCE & LIFE SAFETY PLANS

Drawing Number

G002

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DEVELOPMENT PLANS FOR
PROPOSED
LANSING SCHOOL DISTRICT
ATTWOOD ELEMENTARY CAFETERIA ADDITION
LANSING, MICHIGAN

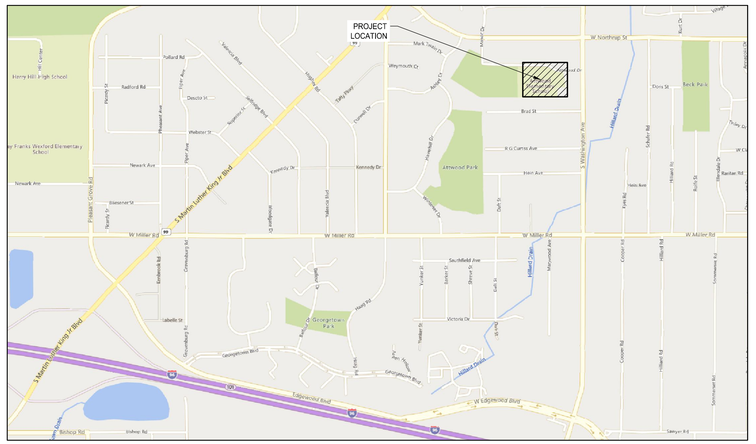
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7TH FLOOR CITY HALL
LANSING, MI 48933
MITCH WHISLER
(517) 483-4455

STORM WATER AND SOIL EROSION AND SEDIMENTATION
CITY OF LANSING SEWER
124 W. MICHIGAN AVENUE
7TH FLOOR CITY HALL
LANSING, MI 48933
ALEX MALVETIS
(517) 483-4455

OWNER
LANSING SCHOOL DISTRICT
519 WEST KALAMAZOO
LANSING, MI 48933
TODD COE
(517) 755-3818



SITE LOCATION MAP
NOT TO SCALE

N

DRAWING KEY

■ INCLUDED IN PLAN SET

□ NOT INCLUDED IN PLAN SET

Sheet List Table

Sheet Number	Sheet Title
■ C000	COVER SHEET
■ --	TOPOGRAPHIC SURVEY
■ C100	DEMO PLAN
■ C200	SITE PLAN
■ C300	GRADING AND STORMWATER PLAN
□ C301	PROPOSED & EXISTING DRAINAGE AREA MAP
■ C310	SESC PLAN
■ C311	SESC DETAILS
■ C700	MISCELLANEOUS DETAILS
□ A011	ARCHITECTURAL SITE PLAN DETAILS
□ A101	FIRST FLOOR PLAN AND DETAILS
□ A103	ROOF PLAN
□ A201	EXTERIOR ELEVATIONS

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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
04/21/2023	SCHEMATIC DESIGN PACKAGE
05/26/2023	DESIGN DEVELOPMENT PACKAGE
05/31/2023	SITE PLAN REVIEW
06/22/2023	OWNER REVIEW
09/18/2023	BID & PERMITS

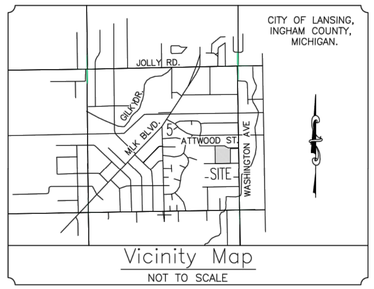
Note:
Unauthorized alteration or addition to this drawing is a violation of the New York State Education Law Article 145, Section 7209.

Project Manager: B.HUYLER	Checked By: P. FURTAW, PE
Designed By: J.ARSENEAULT	Drawn By: J.ARSENEAULT
Date Issued: 9/18/2023	Project Number: 23005898A

COVER SHEET

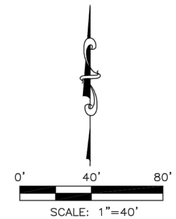
Drawing Number:

C000



Vicinity Map

NOT TO SCALE



SCALE: 1"=40'

SECTION 5
TOWNSHIP 03 NORTH, RANGE 02 WEST, CITY OF LANSING, MI

STRUCTURE INVENTORY

CB 1068
RIM: 863.33
12" RCP NORTH: 859.63

STMH 1067
RIM: 863.58
15" RCP EAST: 859.60
12" RCP NORTH: 859.63
12" RCP SOUTH: 859.68

STMH 1245
RIM: 864.56
15" RCP WEST: 859.15
15" RCP SSW: 858.97
15" RCP SE: 859.05

SMH 1246
RIM: 864.39
8" VCP WEST: 855.98
8" VCP SOUTH: 856.00
10" VCP SE: 856.06

CB 1273
RIM: 863.66
12" RCP NE: 858.86

SMH 1275
RIM: 864.34
10" VCP NW: 855.33
10" VCP EAST: 855.51

STMH 1276
RIM: 864.11
21" NW: 858.62
21" EAST: 858.54

CB 1314
RIM: 863.18
12" RCP SOUTH: 859.62

STMH 1315
RIM: 863.94
15" RCP NW: 858.75
21" RCP SE: 858.37
12" RCP SE: 858.80
12" RCP NE: 858.69

CB 1316
RIM: 864.28
12" RCP SW: 859.51

COORDINATE METADATA

The basis of coordinates for this survey is the Michigan Coordinate System (NAD 83) Michigan South Zone (zone number 2113) as determined locally by GPS observations on 25-APR-2023. The nearest CORS reference station is:

AM7017 LANSING CORS ARP

The combined scale factor for the project area is: 0.99987750
The Adjustment and Epoch date of the primary control is:
NAD 83 (2011) 2010.00
The reference ellipsoid is GRS80/GEOID18
The coordinates as shown for this project are displayed in the Grid system. To determine the ground distances (local grid) and/or coordinates for this project, multiply the coordinates or displayed grid distances by the inverse of the combined scale factor for the project.

The ground (local grid) scale factor for the project area is: 1.00012251
The Local control point for this project is C.P. #86753 and has the following standard deviation:

Northing – 0.02 ift
Easting – 0.02 ift
Elevation – 0.02 ift

Elevations reference the NAVD88 vertical datum as derived from GPS observations (GRS80/Geoid18).

DESCRIPTION

DESCRIPTION (FROM TAX RECORDS)

COMMENCING 375.38 FEET WEST OF THE NORTHEAST CORNER OF DEAN SUBDIVISION; THENCE WEST ON THE NORTH LINE OF DEAN SUBDIVISION, 452.52 FEET; THENCE NORTH 434 FEET TO THE SOUTH LINE OF ATTWOOD STREET; THENCE EASTERLY ALONG THE SOUTH LINE OF ATTWOOD STREET, 895.26 FEET TO THE EAST LINE OF SECTION 5; THENCE SOUTH 1 FOOT; THENCE WEST 425.38 FEET PARALLEL WITH THE NORTH LINE OF DEAN SUBDIVISION; THENCE SOUTH 355 FEET TO THE POINT OF BEGINNING.

SECTION 5, T3N, R2W.

BENCHMARKS

ELEVATIONS ARE DERIVED FROM GPS OBSERVATIONS REFERENCING GRS80/GEOID18 TO DETERMINE ELEVATIONS IN THE NAVD88 VERTICAL DATUM.

BENCHMARK NO 1
SOUTH FLANGE BOLT NEXT TO "O" IN "OPEN" ON HYDRANT ON THE NORTH SIDE OF ATTWOOD STREET NEAR THE NORTHWEST CORNER OF THE SCHOOL.
ELEVATION: 866.65 (NAVD88 DATUM).

BENCHMARK NO 2
RAILROAD SPIKE IN THE SOUTH SIDE OF A UTILITY POLE LOCATED ON THE NORTH SIDE OF ATTWOOD STREET NORTH OF THE SCHOOL.
ELEVATION: 865.86 (NAVD88 DATUM).

CONTROL POINTS

CONTROL POINT NO 86753
5/8" X 24" STEEL BAR WITH GDI TRAVERSE CAP LOCATED IN THE LAWN WEST OF THE EXISTING PARKING LOT.
N: 428307.526, E: 13069666.309
ELEVATION: 864.56 (NAVD88 DATUM).

CONTROL POINT 86754
5/8" X 24" STEEL BAR WITH GDI TRAVERSE CAP LOCATED IN THE LAWN NORTHEAST OF THE EXISTING PARKING LOT AND NORTH OF THE SCHOOL.
N: 428414.357, E: 13069851.962
ELEVATION: 864.88 (NAVD88 DATUM).

GENERAL NOTES

1) THIS DOCUMENT IS A TOPOGRAPHIC SURVEY ONLY AND MUST NOT BE USED TO CONVEY TITLE OR DETERMINE TITLE LINES. THIS DRAWING IS NOT A CERTIFIED SURVEY BUT IS COMPILED FROM EXISTING FIELD SURVEY DATA. THE DRAWING DOES NOT COMPLY WITH MCL 54.211–54.213.

2) UTILITY LINES SHOWN WERE BASED ON PLANS PROVIDED UNDER A MISS DIG DEMAC TICKET NO. 2023041401562.

3) DIMENSIONS SHOWN ARE IN INTERNATIONAL FEET AND DECIMALS THEREOF.

4) THE WORD "CERTIFY" OR "CERTIFICATION" AS USED HEREIN IS AN EXPRESSION OF A PROFESSIONAL OPINION BY THE SURVEYOR BASED UPON HIS BEST KNOWLEDGE, INFORMATION, AND BELIEF, AS SUCH, IT DOES NOT CONSTITUTE A GUARANTEE OR WARRANTY, EXPRESSED OR IMPLIED, OR LEGAL OPINION.

BEARING BASIS

BEARINGS ARE BASED ON THE MICHIGAN COORDINATE SYSTEM OF 1983, SOUTH ZONE REFERENCING GRID NORTH.

FEMA 100 YEAR FLOODPLAIN NOTE

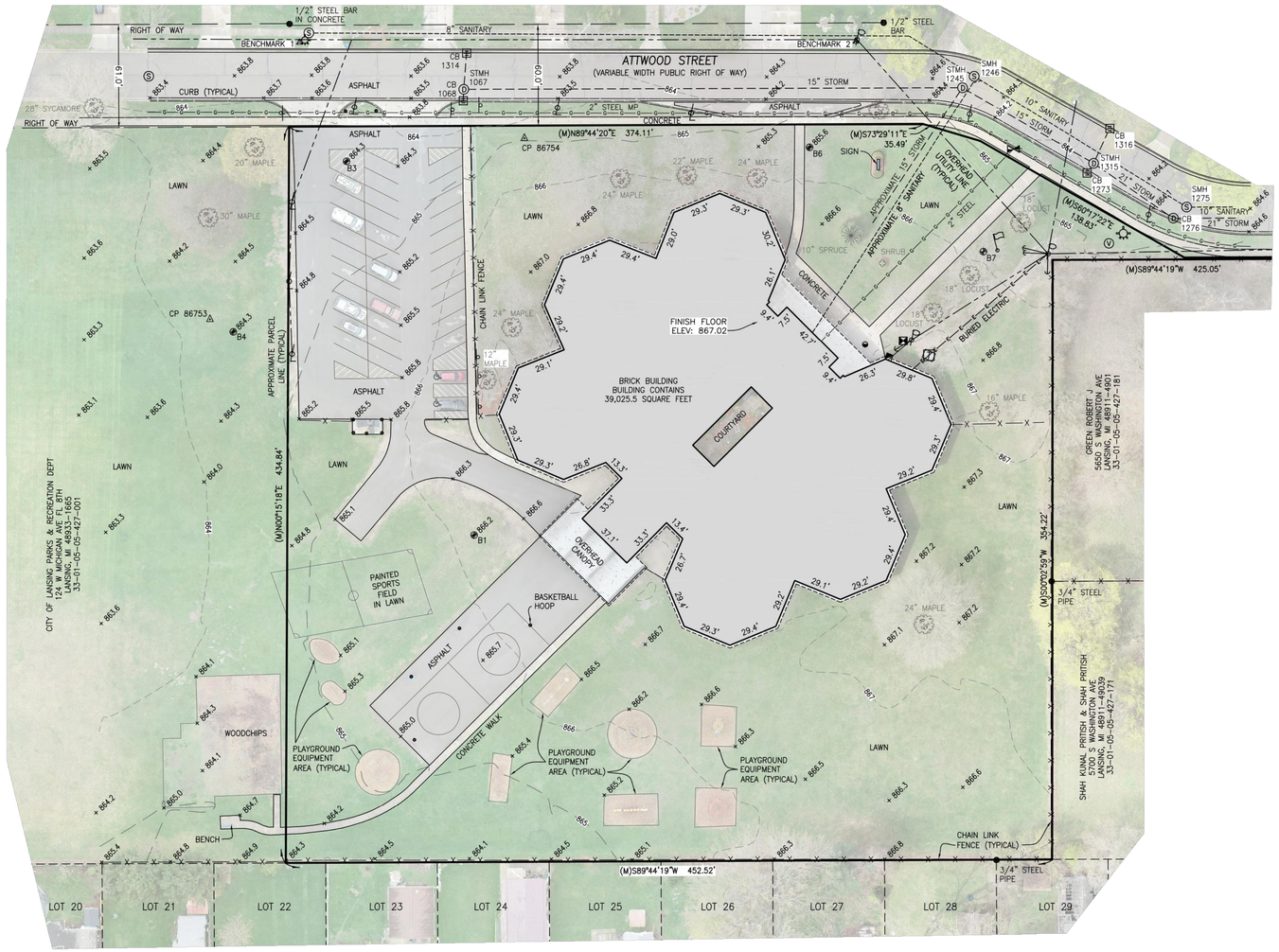
BY GRAPHIC PLOTTING ONLY, THIS PARCEL IS LOCATED IN ZONE X OF THE FLOOD INSURANCE RATE MAP NUMBER 26065C0137D WHICH BEARS AN EFFECTIVE DATE OF 08/16/2011.

LEGEND

- Power Pole
- Power Pole w/Light
- Light Pole
- Telephone Pole
- Guy Wire
- Transformer
- Electric Manhole
- Telephone Manhole
- Telephone Pedestal
- Electric Meter
- Cable Box
- Air Conditioner Unit
- Easement Identifier
- Distance not to scale
- Flag Pole
- Sign (As Noted)
- Well Head
- Satellite Dish
- Tower
- Water Valve
- Fire Hydrant
- Water Manhole
- Water Meter Pit
- Water Meter
- Indicates Handicapped Parking
- Parking Count
- Storm Manhole
- Storm Catchbasin
- Deciduous Tree
- Coniferous Tree
- Sanitary Manhole
- Sanitary Clean Out
- Gas Valve
- Gas Manhole
- Gas Meter
- Gas Marker
- Section Corner
- Set 5/8" Bar & Cap
- Found Corner Monument
- Monitoring Well

ABBREVIATIONS

R = RECORDED
M = MEASURED
C = CALCULATED
N = NORTH
E = EAST
S = SOUTH
W = WEST
T-N = TOWN – NORTH
R-E = RANGE – EAST
SQ. FT. = SQUARE FEET
NE = NORTHEAST
SE = SOUTHEAST
SW = SOUTHWEST
NW = NORTHWEST
AVE. = AVENUE
BLVD. = BOULEVARD
CT. = COURT
RD. = ROAD
ST. = STREET
PID = PARCEL AND OWNER IDENTIFICATION



UTILITY PROVIDERS

UTILITY COMPANIES NOTIFIED FOR RECORD PLAN INFORMATION PER MISS DIG DEMAC REQUEST TICKET NO. 2023041401562 DATED 14APRIL2023

Station Code	Authority Name	Phone	Status
ATTD	AT&T TELEPHONE	8007789140	Notification Sent
CEGD20	CONSUMERS ENERGY	8007789140	Notification Sent
CEGDIS	CONSUMERS ENERGY GAS	8007789140	Notification Sent
LANBW2ELE	LANSING BOARD OF WATER & LIGHT ELECTRIC	5177027030	Notification Sent
LANBW2WTR	LANSING BOARD OF WATER & LIGHT POTABLE WATER	5177027030	Notification Sent
LANSCYSANI	LANSING CITY PUBLIC SERVICE SANITARY SEWER	5174834161	Notification Sent
LANSCYSTRM	LANSING CITY PUBLIC SERVICE STORM SEWER	5174834161	Notification Sent
MFNFBR	METRO FIBERNET, LLC FIBER OPTICS	8007789140	Notification Sent
ZAYOMI	ZAYO BANDWIDTH MIDWEST, LLC FIBER OPTICS	8009616500	Notification Sent

MAPPING CERTIFICATION:

I HEREBY CERTIFY TO PARTIES NAMED HEREON THAT THIS PROJECT WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION; THAT THIS TOPOGRAPHIC SURVEY WAS PERFORMED AT THE 95% CONFIDENCE LEVEL TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS. THE ORIGINAL DATA WAS OBTAINED ON 25–APRIL–2023; ALL COORDINATES ARE BASED ON A GRID PROJECTION IN INTERNATIONAL FEET AND ALL ELEVATIONS ARE BASED ON THE NAVD88 VERTICAL DATUM DERIVED FROM GPS OBSERVATIONS REFERENCING NGS CONTROL STATIONS.

STATE OF MICHIGAN
Gilbert Marshall Barish
PROFESSIONAL SURVEYOR
No. 4001047942
LICENSED PROFESSIONAL SURVEYOR

GILBERT M. BARISH, P.S. #4001047942

UNDERGROUND UTILITY NOTE

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD OBSERVATIONS AND/OR EXISTING DRAWINGS AS PROVIDED BY THE FACILITY OWNER. THE UNDERGROUND UTILITIES SHOWN MAY NOT COMPRISE ALL SUCH UTILITIES ON OR NEAR THE SURVEYED PARCEL, EITHER IN SERVICE OR ABANDONED. THE LOCATION OF BURIED UTILITIES ARE SHOWN TO INDICATE THAT A UTILITY EXIST, BUT MAY REQUIRE SUB-SURFACE INVESTIGATION TO DETERMINE THE EXACT LOCATION.

This Survey has been prepared solely for the benefit of the parties set forth in the Surveyor's Certification. Geodetic Designs Incorporated has no duty or obligation for any party that is not identified in the Surveyor's Certification.

Geodetic Designs Incorporated will not include the providers of any third party reports in the Surveyor's Certification.

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TOPOGRAPHIC MAPPING

PREPARED BY:

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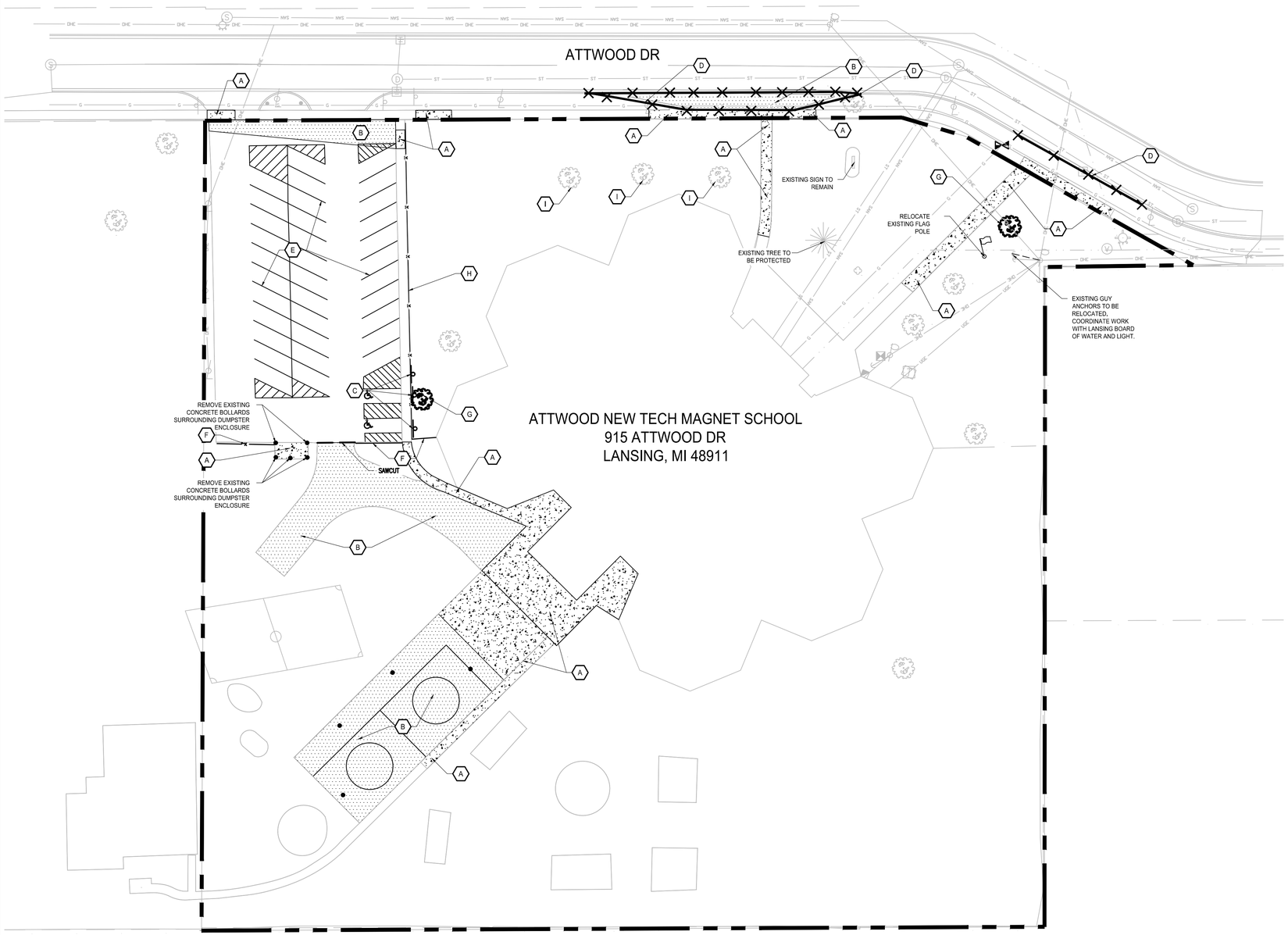
10MAY2023	ATTWOOD STREET INVENTORY	GMB
DATE	REVISION	BY

Bergmann and Associates
Lansing Attwood School

915 Attwood Street
Lansing, MI 48911
33-01-05-05-427-201

DATE: 25 APRIL 2023	SCALE: 1" = 40'
FIELD BY: JC GB	DRAWN BY: GB
CHECKED BY: JC	JOB NUMBER: S035-2022

ARCH D 24x36



DEMOLITION NOTES:

1. APPURTENANCES DESIGNATED FOR DEMOLITION SHALL NOT BE DISTURBED BY THE CONTRACTOR UNTIL FURNISHED WITH NOTICE OF POSSESSION AND APPROVAL TO PROCEED FROM OWNER AND ACQUISITION OF ALL APPROPRIATE CONTRACTS. THE CONTRACTOR SHALL COORDINATE THE SCHEDULE WITH EXISTING TENANTS AND ADJACENT PROPERTY OWNERS, FOUNDATIONS, SLABS, ALL UNDERGROUND STRUCTURES, AND UTILITIES DESIGNATED FOR REMOVAL SHALL BE REMOVED ENTIRELY UNLESS OTHERWISE NOTED. AREAS TO BE BACK FILLED IN ACCORDANCE WITH GEOTECHNICAL REPORT.
2. CONTRACTOR IS SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES THAT ARE INTENDED TO PROVIDE SERVICE WHETHER SHOWN ON THE PLANS OR NOT.
3. CONTRACTOR TO VERIFY THAT ALL UTILITIES HAVE BEEN ABANDONED OR PROPERLY SHUTOFF PRIOR TO EXCAVATION.
4. EXISTING UTILITIES AND TOPO LOCATIONS ARE BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITY LOCATIONS.
5. PRIOR TO INITIATING DEMOLITION WORK, THE CONTRACTOR SHALL DEVELOP A DIGITAL PHOTOGRAPH AND/OR VIDEO RECORD OF THE EXISTING STRUCTURES AND SURROUNDING PROPERTIES. THE RECORD SHALL INCLUDE CONDITIONS OF EXISTING STREETS AND ADJACENT PROPERTIES. ONE COPY OF THE PHOTOGRAPH AND/OR VIDEO RECORD SHALL BE PROVIDED TO THE OWNER.
6. ALL DEBRIS FROM DEMOLITION, NOT BEING REUSED, SHALL BE HAULED OFF SITE AND DISPOSED OF BY LEGAL MEANS.
7. CONTRACTOR SHALL ERECT AND MAINTAIN TEMPORARY FENCE, 6 FOOT MINIMUM HEIGHT, FOR THE DURATION OF ALL DEMOLITION PHASES.
8. CONTRACTOR SHALL NOT RESTRICT ACCESS TO ADJOINING PROPERTIES DURING DEMOLITION OR CONSTRUCTION. ACCESS SHALL BE MAINTAINED SO AS NOT TO INTERRUPT NORMAL OPERATIONS OF ADJACENT FACILITIES.
9. CONTRACTOR SHALL NOT ALLOW ANY UTILITY OR SERVICES TO THE NEIGHBORING PROPERTY(S) TO BE INTERRUPTED WITHOUT THE EXPRESSED WRITTEN PERMISSION OF THE RESPECTIVE OWNERS. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN ALL UTILITY SERVICES TO THE NEIGHBORING BUILDINGS. IF IT IS NECESSARY FOR CONNECTIONS TO BE INTERRUPTED, THE CONTRACTOR IS RESPONSIBLE TO PROVIDE TEMPORARY SERVICES (I.E.. GENERATORS, PORTABLE GAS TANKS, ETC.), THE CONTRACTOR IS RESPONSIBLE TO COORDINATE ALL UTILITY ABANDONMENT AND REMOVAL WITH THE RESPECTIVE UTILITY COMPANIES.
10. WORK CANNOT OCCUR OUTSIDE OF THE DEMOLITION LIMITS WITHOUT PRIOR CONSENT OF OWNER, ADJACENT OWNER, AND LOCAL JURISDICTION.
11. EROSION CONTROL PRACTICES MUST BE IN PLACE AND MAINTAINED DURING DEMOLITION.

SITE LEGEND:

- (1) KEY NOTE
- REMOVE EXISTING CONCRETE
- REMOVE EXISTING PAVEMENT
- REMOVE EXISTING CURB OR CURB AND GUTTER (ADD ALTERNATE)
- PROPERTY LINE
- SAWCUT

KEY NOTES:

A. REMOVE EXISTING CONCRETE. SAWCUT TO NEAREST JOINT.

B. SAWCUT AND REMOVE EXISTING PAVEMENT AND UNDERLYING MATERIAL.

C. REMOVE EXISTING ADA PARKING SIGNS.

D. REMOVE EXISTING CURB OR CURB AND GUTTER. SAWCUT TO NEAREST JOINT.

E. CRACK FILL AND SEAL PARKING LOT. SEE SITE PLAN FOR DETAILS.

F. REMOVE EXISTING CHAIN LINK FENCE.

G. REMOVE EXISTING TREE.

H. REMOVE AND REPLACE EXISTING FENCE.

I. PROTECT EXISTING TREE.

N

0 30 60 90 FT

1" = 30' SCALE BAR

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

7050 West Saginaw Hwy.
Suite 200
Lansing, MI 48917

office: 517.272.9835
fax: 517.272.9836
www.bergmannpc.com

Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
04/21/2023	SCHEMATIC DESIGN PACKAGE
05/26/2023	DESIGN DEVELOPMENT PACKAGE
05/31/2023	SITE PLAN REVIEW
06/22/2023	OWNER REVIEW
09/18/2023	BID & PERMITS

Note:
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Project Manager: B.HUYLER	Checked By: P. FURTAW, PE
Designed By: J.ARSENEAULT	Drawn By: J.ARSENEAULT
Date Issued: 9/18/2023	Project Number: 23005898A

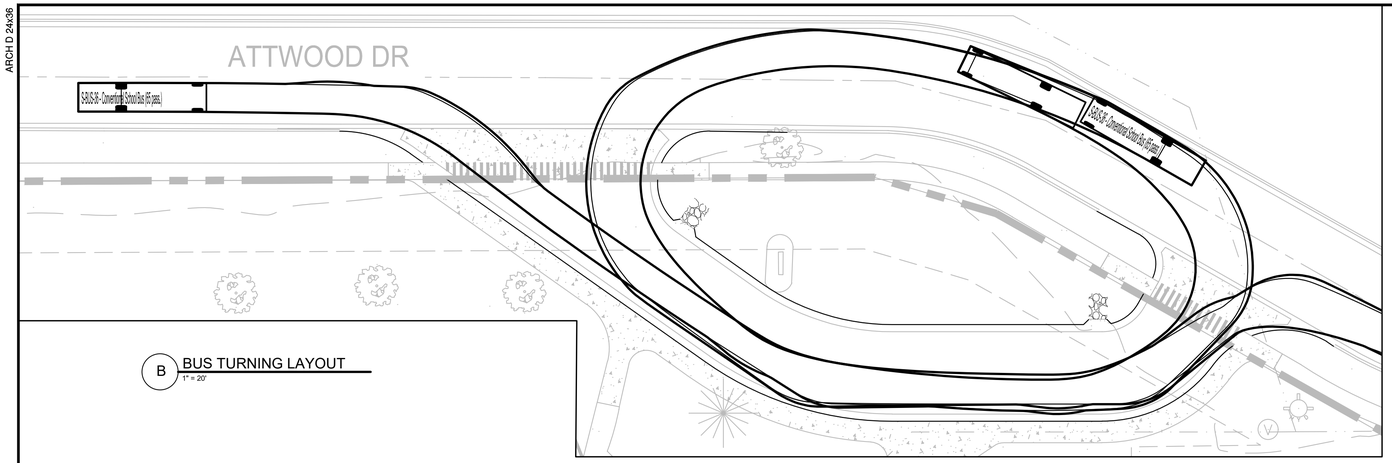
DEMO PLAN

Drawing Number:

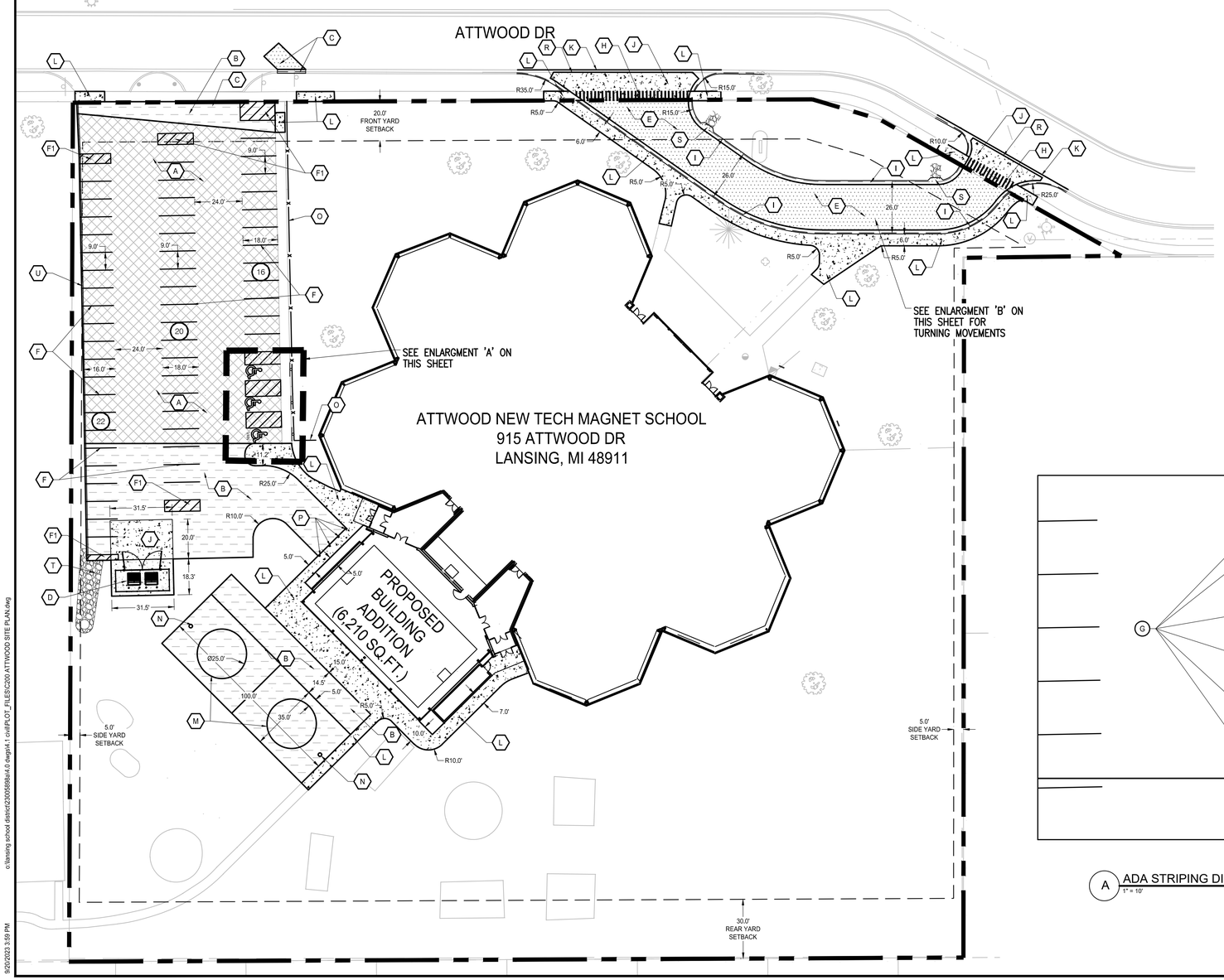
C100

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9/20/2023 3:59 PM

ARCH D 24x36



B BUS TURNING LAYOUT
1" = 20'



KEY NOTES:

A. CRACK FILL AND SEAL PARKING LOT. WORK INCLUDES THE FOLLOWING.
- USE TYPE II JOINT SEALANT.
- CLEAN CRACKS AND JOINTS.
- USE EMULSIFIED ASPHALT SLURRY TO SEAL CRACKS AND JOINTS LESS THAN ¼" WIDE.
- USE HOT APPLIED JOINT SEALANT TO SEAL CRACKS AND JOINTS MORE THAN ¼" WIDE.
- SEAL COAT ENTIRE ASPHALT SURFACE WITH TWO (2) COATS OF COAL TAR SEALER AT A MINIMUM APPLICATION RATE OF 5 SYD/GALLON.

B. STANDARD ASPHALT PAVEMENT SECTION. SEE DETAILS A2 ON SHEET C700.

C. REMOVE AND REPLACE EXISTING ASPHALT PAVEMENT AND CURB AND GUTTER AS NECESSARY TO ACCOMMODATE PROPOSED STORM SEWER.

D. DUMPSTER ENCLOSURE. SEE ARCHITECTURE PLANS.

E. HEAVY-DUTY ASPHALT PAVEMENT SECTION. SEE DETAILS A3 ON SHEET C700.

F. 4" SOLID WHITE STRIPE (TYP.)

F1. 4" SOLID WHITE STRIPE @12" ON CENTER.

G. ADA STRIPING, PER DETAIL A9 ON SHEET C700.

H. CROSSWALK STRIPING. 4" WIDE SOLID WHITE LINES @24" O.C.

I. CONCRETE CURB AND GUTTER. SEE DETAIL A6 ON SHEET C700.

J. INSTALL CONCRETE PAVEMENT. SEE DETAIL A4 ON SHEET C700.

K. WORK REQUIRES A RIGHT-OF-WAY PERMIT FROM THE CITY OF LANSING. PERMIT TO BE SECURED BY CONTRACTOR.

L. CONCRETE SIDEWALK. SEE DETAIL A5 ON SHEET C700.

M. 4" SOLID YELLOW PAINT MARKS FOR PLAYGROUND.

N. INSTALL NEW PORTER "184.4 BACK-TO-BACK OUTDOOR BACKSTOP" BASKETBALL HOOP (OR APPROVED EQUAL). WORK TO INCLUDE 3' DIA.x 42" DEEP FOUNDATION PER POLE.

O. REPLACE CHAIN LINK FENCE TO MATCH EXISTING.

P. BOLLARDS. SEE DETAIL A7 ON SHEET C700.

Q. REMOVE EXISTING ADA SIGNS. REPLACE WITH NEW ADA SIGNS PER DETAIL A11 ON SHEET C700.

R. MDOT TYPE 'M' OPENING.

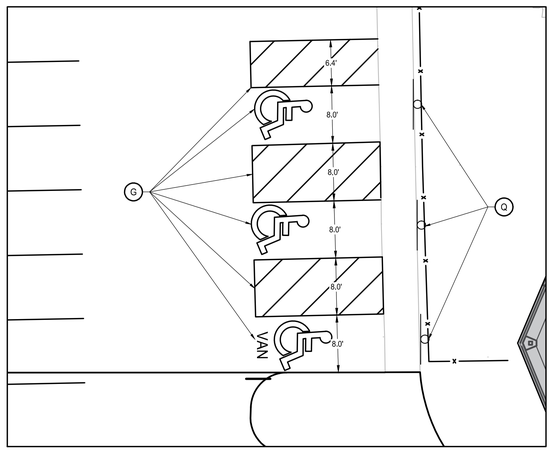
S. SPILLWAY PER DETAIL A8 ON SHEET C700.

T. RIP RAP

U. ASPHALT CURB. INSTALL PER MDOT STANDARDS.

SITE LEGEND:

- A — KEY NOTE
- PROPERTY LINE
- CRACK FILL AND SEAL
- HEAVY-DUTY HMA. SEE DETAIL A3 ON SHEET C700
- CONCRETE. SEE DETAIL A4 ON SHEET C700.
- LIGHT-DUTY HMA PAVEMENT SECTION. SEE DETAIL A2 ON SHEET C700
- RIP-RAP



A ADA STRIPING DIMENSIONS
1" = 10'

GENERAL NOTES:

1. THE UNDERGROUND STRUCTURES AND UTILITIES SHOWN ON THESE PLANS HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORD MAPS. THEY ARE NOT CERTIFIED TO THE ACCURACY OF THEIR LOCATION AND/OR COMPLETENESS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE LOCATION AND EXTENT OF ALL UNDERGROUND STRUCTURES AND UTILITIES PRIOR TO ANY DIGGING OR CONSTRUCTION ACTIVITIES IN THEIR VICINITY.
2. THE CONTRACTOR SHALL PERFORM ALL WORK IN COMPLIANCE WITH TITLE 29 OF FEDERAL REGULATIONS, PART 1926, SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION (OSHA).
3. ALL ROADS AND PRIVATE DRIVES SHALL BE KEPT CLEAN OF MUD, DEBRIS ETC. AT ALL TIMES.
4. THE CONTRACTOR SHALL CONSULT THE CONSTRUCTION MANAGER BEFORE DEVIATING FROM THESE PLANS.
5. ALL EXISTING SURFACE APPURTENANCES (I.E. WATER VALVES, CATCH BASIN FRAMES AND GRATES, MANHOLE COVERS) WITHIN THE PROJECT LIMITS SHALL BE ADJUSTED TO FINISHED GRADE.
6. AREAS DISTURBED OR DAMAGED AS PART OF THIS PROJECT'S CONSTRUCTION THAT ARE OUTSIDE OF THE PRIMARY WORK AREA SHALL BE RESTORED, AT THE CONTRACTOR'S EXPENSE, TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
7. THE CONTRACTOR SHALL CALL "MISS DIG" AT LEAST 3 WORKING DAYS (EXCLUDING WEEKENDS AND HOLIDAYS) PRIOR TO CONSTRUCTION.
8. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE APPLICABLE CODES, ORDINANCES, DESIGN STANDARDS AND STANDARD SPECIFICATIONS OF THE AGENCIES WHICH HAVE THE RESPONSIBILITY OF REVIEWING PLANS AND SPECIFICATIONS FOR CONSTRUCTION OF ALL ITEMS INCLUDED IN THESE PLANS.
9. UNLESS SPECIFICALLY STATED, THE CONTRACTOR SHALL APPLY FOR AND OBTAIN ALL NECESSARY PERMITS AS REQUIRED FOR CONSTRUCTION OF THIS PROJECT PRIOR TO THE BEGINNING OF WORK FROM THE PREVIOUSLY MENTIONED AGENCIES.
10. THE CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
11. WHEN ANY EXISTING UTILITY REQUIRES ADJUSTMENT OR RELOCATION, THE CONTRACTOR SHALL NOTIFY THE PROPER UTILITY COMPANY AND COORDINATE THE WORK ACCORDINGLY. THERE SHALL BE NO CLAIM MADE BY THE CONTRACTOR FOR ANY COSTS CAUSED BY DELAYS IN CONSTRUCTION DUE TO THE ADJUSTMENT OR RELOCATION OF UTILITIES.
12. THE CONTRACTOR IS TO VERIFY THAT THE PLANS AND SPECIFICATIONS THAT HE/SHE IS BUILDING FROM ARE THE VERY LATEST PLANS AND SPECIFICATIONS THAT HAVE BEEN APPROVED BY ALL APPLICABLE PERMIT-ISSUING AGENCIES AND THE OWNER. ALL ITEMS CONSTRUCTED BY THE CONTRACTOR PRIOR TO RECEIVING THE FINAL APPROVAL AND PERMITS HAVING TO BE ADJUSTED OR RE-DONE, SHALL BE DONE AT THE CONTRACTOR'S EXPENSE.
13. SHOULD THE CONTRACTOR ENCOUNTER CONFLICT BETWEEN THESE PLANS AND SPECIFICATIONS, EITHER AMONG THEMSELVES OR WITH THE REQUIREMENTS OF ANY AND ALL REVIEWING AND PERMIT-ISSUING AGENCIES, HE/SHE SHALL SEEK CLARIFICATION IN WRITING FROM THE CONSTRUCTION MANAGER BEFORE COMMENCEMENT OF CONSTRUCTION. FAILURE TO DO SO SHALL BE AT THE SOLE EXPENSE TO THE CONTRACTOR.
14. THE CONTRACTOR SHALL FURNISH AS-BUILT DRAWINGS INDICATING ALL CHANGES AND DEVIATIONS FROM APPROVED DRAWINGS.
15. ALL SIGNS AND TRAFFIC CONTROL MEASURES DURING CONSTRUCTION AND MAINTENANCE ACTIVITIES SHALL BE CONSTRUCTED AND INSTALLED PER THE LATEST EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.M.U.T.C.D.).
16. ALL WORK WITHIN THE PUBLIC RIGHT OF WAY SHALL CONFORM TO THE STANDARDS OF THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

SITE DATA:

PARCEL ID: 33-01-05-05-427-201

ZONING: SITE - R-AR - RESIDENTIAL ADAPTIVE REUSE
NORTH - R-2 - SUBURBAN DETACHED RESIDENTIAL
EAST - R-2 - SUBURBAN DETACHED RESIDENTIAL
WEST - R-2 - SUBURBAN DETACHED RESIDENTIAL
SOUTH - R-2 - SUBURBAN DETACHED RESIDENTIAL

LAND USE: SITE - ELEMENTARY SCHOOL (EXISTING)
ELEMENTARY SCHOOL (PROPOSED)

LOT AREA: 4.5 ACRES

SETBACKS: FRONT: 20' BUILDING
REAR: 30' BUILDING
SIDE: 5' BUILDING
PARKING: 20'

BUILDING HEIGHT: 35' ALLOWED

PARKING: ONE SPACE FOR EACH TEACHER OR ADMINISTRATOR PLUS SEPARATE LOADING/UNLOADING AREA FOR BUSES. PARKING ONLY ALLOWED IN REAR AND SIDE YARDS

N

0 30 60 90 FT
1" = 30' SCALE BAR

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

7050 West Saginaw Hwy.
Suite 200
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Lansing School District

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915 ATTWOOD DR
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06/22/2023	OWNER REVIEW
09/18/2023	BID & PERMITS

Note:
Unauthorized alteration or addition to this drawing is a violation of the New York State Education Law Article 145, Section 7209.

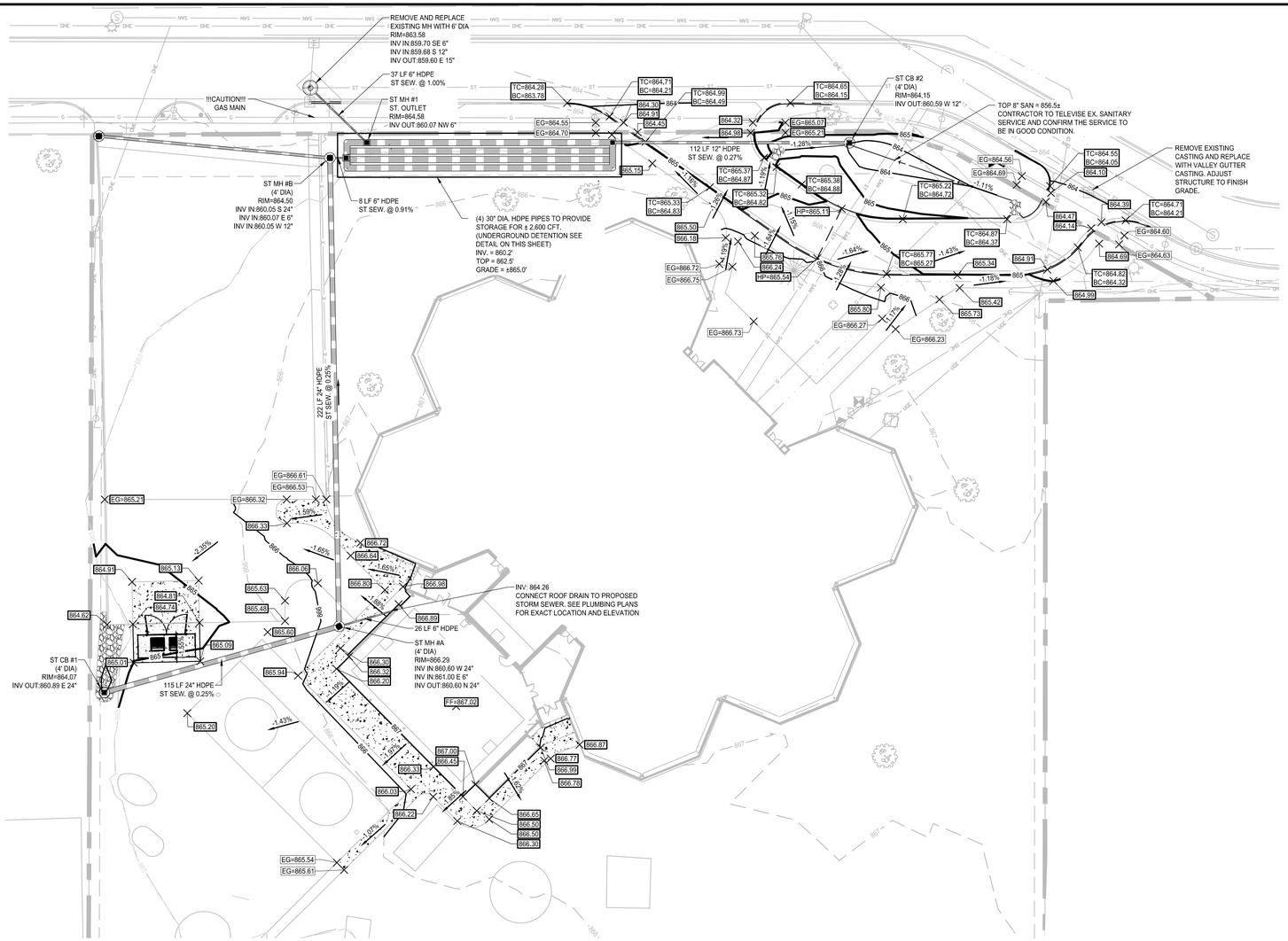
Project Manager:	Checked By:
B.HUYLER	P. FURTAW, PE
Designed By:	Drawn By:
J.ARSENEAULT	J.ARSENEAULT
Date Issued:	Project Number:
9/18/2023	23005898A

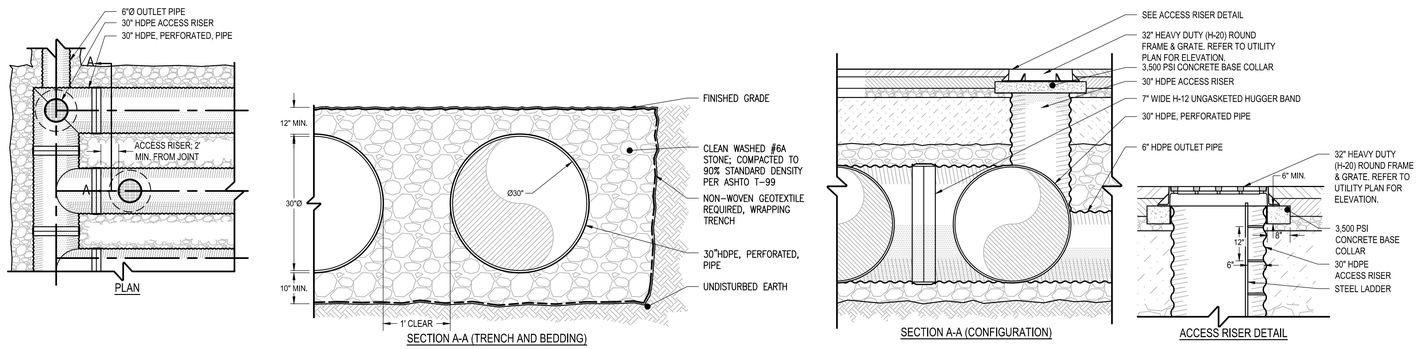
SITE PLAN

Drawing Number:

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UNDERGROUND STORMWATER DETENTION SYSTEM

N.T.S.

GRADING NOTES

1. REFER TO EROSION AND SEDIMENT CONTROL PLAN FOR REQUIRED EROSION AND SEDIMENT CONTROL MEASURES.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE MAINTENANCE AND REMOVAL OF TEMPORARY SEDIMENTATION CONTROLS. EROSION CONTROL MEASURES SHALL NOT BE REMOVED BEFORE VEGETATION HAS OCCURRED COMPLETELY.
3. ALL SILT FENCE TO BE REPLACED WHENEVER THEY BECOME CLOGGED OR INOPERABLE AND SHALL BE REPLACED AT A MINIMUM OF EVERY 3 MONTHS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORATION OF TOPSOIL TO ALL DISTURBED AREAS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN EROSION CONTROL MEASURES AT ALL TIMES.
5. SILT FENCE, JUTE MESH, AND/OR EROSION CONTROL BLANKETS WILL BE USED ON STEEP SLOPES AND WHEREVER NECESSARY TO CONTROL EROSION AND SILTATION OF EXISTING DRAINAGE SYSTEMS AS ORDERED BY THE ENGINEER OR SPECIFIED ON PLANS.
6. THE CONTRACTOR SHALL DESIGNATE A MEMBER OF HIS/HER FIRM TO BE RESPONSIBLE TO MONITOR EROSION CONTROL, EROSION CONTROL STRUCTURES, TREE PROTECTION AND PRESERVATION THROUGHOUT CONSTRUCTION.
7. ALL DISTURBED AREAS SHALL BE PROTECTED FROM EROSION EITHER BY MULCH OR TEMPORARY SEEDING WITHIN 2 WEEKS OF DISTURBANCE.
8. ALL SITE GRADING MUST BE PERFORMED TO INSURE POSITIVE DRAINAGE ACROSS THE ENTIRE SITE, THROUGHOUT THE PERIOD OF CONSTRUCTION AND AFTER PROJECT COMPLETION.
9. ALL SEDIMENTATION AND SOIL EROSION CONTROL MEASURES SHALL BE CONSTRUCTED PRIOR TO THE COMMENCEMENT OF SITE GRADING AND MUST CONFORM TO PART 91 OF ACT 451 OF THE PUBLIC ACTS OF 1994 AS AMENDED. ALL APPLICABLE PERMITS SHALL BE OBTAINED BEFORE IMPLEMENTING THESE MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE SEDIMENTATION AND SOIL EROSION CONTROL MEASURES THROUGHOUT CONSTRUCTION.
10. IN GENERAL, EARTHWORK AND PAVEMENT CONSTRUCTION SHOULD BE PERFORMED IN ACCORDANCE WITHE THE LATEST MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION UNLESS OTHERWISE NOTED.
11. REMOVE ANY EXISTING TOPSOIL, ORGANIC SOILS, UNSUITABLE FILL, VEGETATION, TREES AN OTHER DELETERIOUS MATERIALS TO EXPOSE THE SUBGRADE SOIL, TREE ROOTS SHOULD BE COMPLETELY REMOVED.
12. EXCAVATE TO THE DEPTH OF THE FINAL SUBGRADE ELEVATION TO ALLOW FOR GRADE CHANGES AND THE PLACEMENT OF THE RECOMMENDED PAVEMENT SYSTEM.
13. ON SITE FILL MATERIAL CAN BE USED IF THE SPECIFIED COMPACTION REQUIREMENTS CAN BE ACHIEVED. IF ON SITE MATERIAL IS USED, IT SHOULD BE CLEAN AND FREE OF FROZEN SOIL, ORGANICS, OR OTHER DELETERIOUS MATERIALS.
14. THE FINAL SUBGRADE SHOULD BE THOROUGHLY PROOFROLLED USING A LOADED TANDEM AXLE TRUCK UNDER THE OBSERVATION OF GEOTECHNICAL/PAVEMENT ENGINEER. LOOSE OR YIELDING AREAS THAT CANNOT BE MECHANICALLY STABILIZED SHOULD BE REMOVED AND REPLACED WITH ENGINEERED FILL OR AS DICTATED BY FIELD CONDITIONS.
15. THE AGGREGATE BASE SHOULD BE COMPACTED TO ACHIEVE A MINIMUM OF 95 PERCENT OF THE MAXIMUM MODIFIED PROCTOR DRY DENSITY. THE BASE AND SUBGRADE COMPACTION SHOULD EXTEND A MINIMUM OF 12 INCHES BEYOND THE PAVED EDGE OR BACK OF CURB.

GRADING LEGEND:

75	PROPOSED MAJOR CONTOUR
76	PROPOSED MINOR CONTOUR
TC=78.01 BC=77.51	PROPOSED TOP OF CURB / BOTTOM OF CURB ELEVATION
77.73	PROPOSED SPOT ELEVATION
EG=77.73	EXISTING ELEVATION
TG=77.73	PROPOSED TOP OF GRATE ELEVATION
FF=77.73	FINISHED FLOOR ELEVATION
2.5%	PROPOSED SLOPE
72	EXISTING CONTOUR
	RIDGE LINE
	SWALE

N

0 30 60 90 FT

1" = 30' SCALE BAR

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

7050 West Saginaw Hwy.
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Lansing, MI 48917

office: 517.272.9835
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
04/21/2023	SCHEMATIC DESIGN PACKAGE
05/26/2023	DESIGN DEVELOPMENT PACKAGE
05/31/2023	SITE PLAN REVIEW
06/22/2023	OWNER REVIEW
09/18/2023	BID & PERMITS

Note:
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Project Manager: B.HUYLER	Checked By: P. FURTAW, PE
Designed By: J.ARSENEAULT	Drawn By: J.ARSENEAULT
Date Issued: 9/18/2023	Project Number: 23005898A

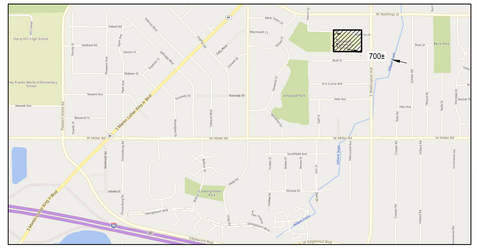
GRADING AND STORMWATER PLAN

Drawing Number:

C300

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SITE LOCATION MAP

NOT TO SCALE

SOIL EROSION/SEDIMENTATION CONTROL OPERATION TIME SCHEDULE

	JANUARY				FEBRUARY				MARCH				APRIL				MAY				JUNE				JULY				AUGUST				SEPTEMBER				OCTOBER				NOVEMBER				DECEMBER			
CONSTRUCTION SEQUENCE	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
2023																																															
TEMPORARY CONSTRUCTION EXITS																																															
TEMPORARY CONTROL MEASURES																																															
SEDIMENT CONTROL BASIN(S)/TRAP(S)																																															
EARTH WORK TO BEGIN																																															
ROUGH GRADING																																															
STORM FACILITIES																																															
SITE CONSTRUCTION																																														
EARTH WORK TO END																																															

1) CONTRACTOR MUST COMPLETE TABLE WITH ESTIMATED DATES OF PROJECT ACTIVITIES PRIOR TO BMP CERTIFICATION.
2) TIME SCHEDULE MUST COINCIDE WITH THE SWPPP IMPLEMENTATION SEQUENCE.

SEQUENCE OF CONSTRUCTION NOTES:

STEP 1: INSTALL TEMPORARY SOIL EROSION CONTROL MEASURES

STEP 2: DEMOLITION.

STEP 3: PAVING.

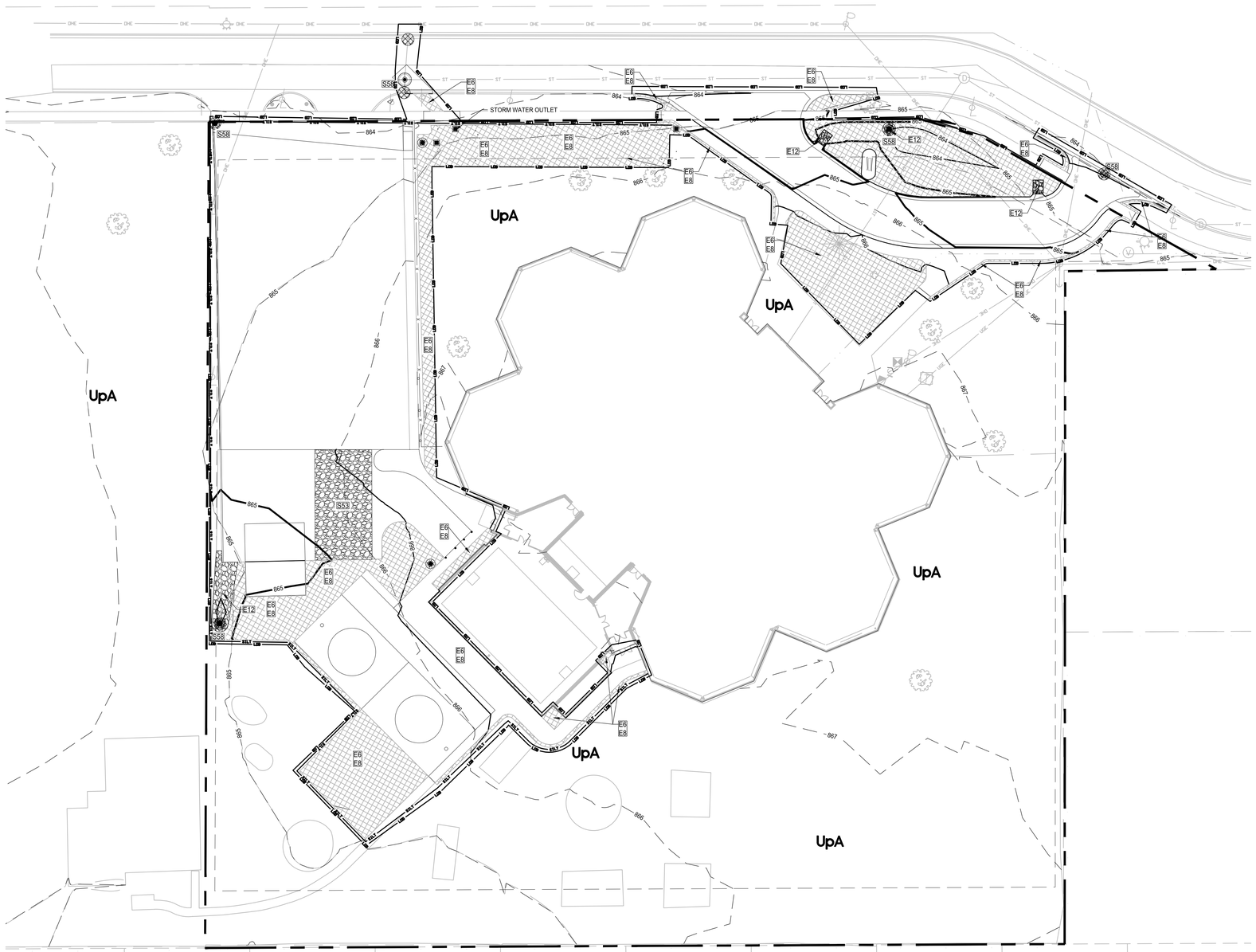
STEP 4: FINAL GRADING: ALL AREAS SHALL BE SEEDED AND MULCHED WITHIN 5 DAYS OF FINAL GRADING.

STEP 4: TEMPORARY SOIL EROSION CONTROL MEASURES ARE TO BE REMOVED WHEN PERMANENT MEASURES ARE IN PLACE AND THE AREA IS STABILIZED.

CONTINUED MAINTENANCE OF ALL PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE OWNER. MAINTENANCE RESPONSIBILITIES SHALL BECOME A PART OF ANY SALES OR EXCHANGE AGREEMENT FOR THE LAND ON WHICH THE PERMANENT SOIL EROSION AND SEDIMENTATION CONTROL MEASURES ARE LOCATED.

SESC NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL SOIL EROSION CONTROL MEASURES DURING CONSTRUCTION. SESC MEASURES SHOULD BE CHECKED DAILY AND AFTER STORM EVENTS FOR EFFECTIVENESS. OWNER SHALL MAINTAIN ALL PERMANENT SESC MEASURES AFTER CONSTRUCTION IS COMPLETE. ALL SESC MEASURES SHALL BE CHECKED MONTHLY FOR ONE YEAR FOR EFFECTIVENESS. ANY MEASURES THAT HAVE FAILED SHALL BE REPAIRED AND/OR REPLACED.
2. ALL TEMPORARY S.E.S.C. MEASURES SHALL BE MAINTAINED 30 DAYS AFTER CONSTRUCTION IS COMPLETE OR UNTIL GRADED AREAS ARE STABILIZED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING TEMPORARY SESC MEASURES.
3. ALL GRADED AREAS EXPOSED FOR MORE THAN 20 DAYS SHALL HAVE STRAW MULCH APPLIED AT THE RATE OF 3 TONS / ACRE. AREAS NOT AT FINISHED GRADE AND WHICH WILL BE DISTURBED AGAIN WITHIN ONE YEAR MUST BE SEEDED AND MULCHED WITH QUICK GROWING TEMPORARY SEEDING MIXTURE AND MULCH. AREAS WHICH ARE AT FINISHED GRADE AND WILL NOT BE DISTURBED FOR A YEAR MUST BE SEEDED AND MULCHED WITH A PERMANENT SEED MIXTURE.
4. ONLY LIMITED DISTURBANCE WILL BE PERMITTED TO PROVIDE ACCESS TO THE SITE FOR GRADING AND TO CONSTRUCT SEDIMENT BASINS, SEDIMENT TRAPS, DIVERSION TERRACES, INTERCEPTOR CHANNELS, AND/OR CHANNELS OF CONVEYANCE AS APPROPRIATE.
5. EROSION AND SEDIMENTATION CONTROLS MUST BE CONSTRUCTED, STABILIZED, AND FUNCTIONAL BEFORE SITE DISTURBANCE WITH THE TRIBUTARY AREAS OF THOSE CONTROLS.
6. UNTIL THE SITE IS STABILIZED, ALL EROSION AND SEDIMENTATION MUST BE MAINTAINED PROPERLY. MAINTENANCE MUST INCLUDE INSPECTIONS OF ALL EROSION AND SEDIMENTATION CONTROL ON A DAILY BASIS AND AFTER EACH STORM EVENT. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT, REGRADING, RESEEDING, REMULCHING, AND RENETTING, MUST BE PERFORMED IMMEDIATELY.
7. NO DEWATERING IS PLANNED FOR THIS PROJECT. IF DEWATERING IS REQUIRED, THE CONTRACTOR SHALL SUBMIT A DEWATERING PLAN FOR APPROVAL TO THE CITY OF LANSING AND/OR THE MDEQ AS REQUIRED. NO DEWATERING SHALL COMMENCE UNTIL APPROVAL HAS BEEN OBTAINED.



ARCH D 24x36

E5 DUST CONTROL SPECIFICATIONS

When
- On construction sites during periods of low precipitation, low humidity, and high temperature or high winds.

Why
- To reduce dust and sedimentation from wind and construction activities.

Where
- Use on unpaved roadways, construction sites with vehicle traffic, soil stockpile areas, and general areas with unstabilized, or fine soils.

How
1. Dust control applications can include watering, chemical dust suppression, gravel or asphalt surfacing, temporary aggregate cover, and haul truck covers.
2. Minimize length of time vulnerable areas are exposed on construction site.
3. Identify and stabilize key access points prior to initiating construction.
4. Quickly stabilize exposed soil by vegetation, mulch, soil erosion control blankets, spray-on adhesives, sprinkling, or stone layering to minimize areas in need of dust control.
5. Follow manufacturers instructions regarding application of any dust palliative. Pay particular attention to mixing details.
6. Apply dust suppressant to surfaces using a pressure type water distributor truck equipped with a spray system.
7. The number of applications to be determined by site engineer.
8. Immediately clean-up sediment tracked onto paved roads.
9. Limit vehicle traffic to 15 miles per hour.
10. Utilize aggregate cover on access, parking, and paved roads.
11. Keep construction traffic directed to stabilized site roadways when possible.

STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E5 DUST CONTROL SPECIFICATIONS

Maintenance
- Frequent, even daily application may be required to increase effectiveness.
- Do not overwater, as overwatering may cause erosion.
- Oil should not be used for dust control, as it may enter a drainageway through runoff or seeping into the soil.

Limitations
- To continue its effectiveness, dust control application needs to be applied on a regular schedule.
- Applying too much water to surface may cause erosion.
- Some types of dust suppressants may make soil water repellant, increasing runoff.

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E6 MULCHING SPECIFICATIONS

When
- When areas are subject to erosive surface sheet flows or severe wind.

Why
- Temporarily protects seeded areas and slopes against erosion from rain or wind. Holds soil moisture to allow for seed germination and reduces wind dessication of germinated seeds. Inhibits seed consumption by birds.

Where
- Use on exposed slopes, newly seeded areas and other areas subject to erosion.

How
1. Other surface runoff control measures should be installed prior to mulching.
2. Prepare surface to proper grade and compaction requirements.
3. If treatment area is to be revegetated immediately, spread or drill seed, or install vegetative sprigs into planting surface.
4. Select mulch material appropriate for site characteristics, including grade, level of traffic, installation method, and accessibility.

   Straw – Most common and widely used material. Provides organic matter as it breaks down. Effectiveness of sediment reduction high for at least 3 months. Subject to windblow and washout. For straw, apply a minimum of 2 tons/acre or approx. 50 lbs./1000 sq.ft. to cover the surface. Increase application rates 50% for dormant seeding.

   Rock – Crushed stone and gravel maintain effectiveness indefinitely if maintained to repair compaction. Cover 2–3" in depth (approx. 2.27 tons/1000 sq. ft.).

   Wood chips/bark – Chips decompose slowly but may require nitrogen fertilizer application to avoid nutrient deficiency. Tend to wash down slopes over 6% and may clog inlet grates. Cover 2–3" in depth.
5. Mulches should not be applied if free surface water is present but may be applied to wet soil.

STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

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STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E8 PERMANENT SEEDING SPECIFICATIONS

When
- To finalize stabilization of temporary seeding areas or when an area needs permanent stabilization following completion of construction. Also used when vegetative establishment can correct existing soil erosion or sedimentation problem.
- Within 5 days of final grade.

Why
- To stabilize soil and prevent or reduce soil erosion/sedimentation problems from developing.

Where
- Used on construction and earth change sites which require permanent vegetative stabilization.

How
1. Review SESC plan and construction phasing to identify areas in need of permanent vegetative stabilization.
2. Select perennial grass and ground cover for permanent cover.
3. Seed mixes vary. However, they should contain native species.
4. Seed mixes should be selected through consultation with a certified seed provider and with consideration of soil type, light, moisture, use applications, and native species content.
5. Soil tests should be performed to determine the nutrient and pH levels in the soil. The pH may need to be adjusted to between 6.5 and 7.0.
6. Prepare a 3–5" deep seedbed, with the top 3–4" consisting of topsoil.
7. Slopes steeper than 1:3 should be roughened.
8. Apply seed as soon as possible after seedbed preparation. Seed may be broadcast by hand, hydroseeding, or by using mechanical drills.
9. Mulch immediately after seeding.
10. Dormant seed mixes are for use after the growing season, using seed which lies dormant in the winter and begins growing as soon as site conditions become favorable.

STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E8 PERMANENT SEEDING SPECIFICATIONS

How (cont.)
11. Protect seeded areas from pedestrian or vehicular traffic.
12. Divert concentrated flows away from the seeded area until vegetation is established.

Maintenance
- Inspect weekly and within 24 hours following each rain event in the first few months following installation to be sure seed has germinated and permanent vegetative cover is being established.
- Add supplemental seed as necessary.

Limitations
- Seeds need adequate time to establish.
- May not be appropriate in areas with frequent traffic.
- Seeded areas may require irrigation during dry periods.
- Seeding success is site specific, consider mulching or sodding when necessary.

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E8 PERMANENT SEEDING

Planting Zones:	Lower Peninsula (South of T20N) Zone 1	Lower Peninsula (North of T20N) Zone 2	Upper Peninsula Zone 3
Seeding Window Permanent Seeding	4/15 – 10/10	5/1 – 10/1	5/1 – 9/20
Seeding Window Dormant Seeding*	11/15 – Freeze	11/01 – Freeze	11/01 – Freeze

Source: Adapted from MDOT Interim 2003 Standard Specifications for Construction

	Zone 1 Lower Peninsula (South of U.S. 10)	Zone 2 Lower Peninsula (North of U.S. 10)	Zone 3 Upper Peninsula
Seeding Dates (With Irrigation or Mulch)	4/1 – 8/1	5/1 – 9/20	5/1 – 9/10
Seeding Dates (w/o Irrigation or Mulch)	4/1 – 5/20 or 8/10 – 10/1	5/1 – 6/10 or 8/1 – 9/20	5/1 – 6/15 or 8/1 – 9/20
Dormant Seeding Dates*	11/1 – Freeze	10/25 – Freeze	10/25 – Freeze

Source: Adapted from USDA NRCS Technical Guide #342 (1999)

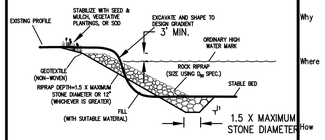
* Dormant seeding is for use in the late fall after the soil temperature remains consistently below 50°F, prior to the ground freezing. This practice is appropriate if construction on a site is completed in the fall but the seed was not planted prior to recommended seeding dates. No seed germination will take place until spring. A cool season annual grass may be added in an attempt to have some fall growth.

- Mulch must be used with dormant seed.
- Do not seed when the ground is frozen or snow covered.
- Do not use a dormant seed mix on grassed waterways.

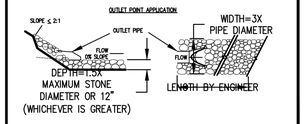
MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E12 RIPRAP

STREAM BANK APPLICATION



OUTLET POINT APPLICATION



STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E12 RIPRAP SPECIFICATIONS

When
- When concentrated water flows have the potential to create scour, down-cutting, or lateral cutting.

Why
- To prevent loss of land or damage to utilities or structures. In aquatic applications, riprap is used to control channel meander and maintain capacity, protect against wave attack, and reduce sediment load.

Where
- In natural or constructed channels with areas susceptible to erosion from the action of water, ice, or debris, or to damage by livestock or vehicular traffic.
- In shoreline areas where the erosion problem may be solved through simple structural measures.
- On slopes with profiles measuring 1:1.5 or less.

How
1. Review subject site to identify areas subject to concentrated flows or wave/current attack.
2. The appropriateness and extent of riprap placement is site specific and should be determined in the field.
3. The area under review for riprap placement must be shaped and contoured appropriately by grading prior to material placement.
4. Non-woven geotextile fabric should be installed prior to riprap placement, with upper end and toe end of fabric buried or anchored to prevent movement.
5. Riprap placement should be started at a stabilized location and ended at a stabilized or contoured point.
6. Material selected for riprap should be hard, angular, and resistant to weathering. Appropriate material size depends on expected water energy and intended function of the material.

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

E12 RIPRAP SPECIFICATIONS

How (cont.)
7. Riprap mixture should be an even mixture of stone sizes based on the average, or D_{50}. This means 50% of the stone, by size, will be larger than the diameter specified, and 50% will be smaller than the size specified. The diameter of the largest stone should not be more than 1.5 times the D_{50} stone size.
8. See table on the following page for typical riprap stone sizes.
9. Rock shall be placed so that larger rocks are uniformly distributed and in contact with one another. Smaller rocks should fill the voids.
10. When in contact with moving water, riprap will tie into a stable bank at the downstream end and will be keyed into the bank at the upstream end. Riprap should extend 3 ft. above the ordinary high water mark or to the top of the bank on short slopes. Extend riprap a minimum 10 ft. beyond active erosion area.

Maintenance
- All installations should be inspected immediately after the first rainfall to confirm the stability of the placed material. Follow-up inspections should occur regularly and provisions made for prompt repair if needed.

Limitations
- Area is cleared prior to the addition of riprap, therefore no areas are preserved with native vegetation.

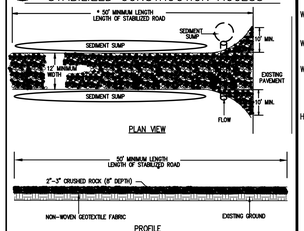
SIZE OF TYPICAL RIPRAP STONES

Weight (lbs.)	Average Spherical Stone Diameter (D_{50}) (in.)	Typical Rectangular Shape Width/Depth (in.)	Typical Rectangular Shape Length (in.)
50	9	18	9
100	11	22	11
150	12	24	12
300	15	30	15
1000	21	42	21
1500	23	46	23
2000	25	50	25
4000	31	62	31
6000	43	72	36
8000	47	94	47
10000	50	100	50

Source: Adapted from USDA NRCS

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

S53 STABILIZED CONSTRUCTION ACCESS



NOTES:
1. Establish stabilized construction entrance prior to the initiation of site construction activities.
2. Care should be taken to prevent material movement into adjacent wetlands/waterbodies.
3. Care should be taken to maintain existing roadside drainage via culvert installation, with sediment sump placed downflow of culvert.

STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

S53 STABILIZED CONSTRUCTION ACCESS SPECIFICATIONS

When
- Construction traffic is expected to leave a construction site.
- Stabilization of interior construction roads is desired.

Why
- To minimize tracking of sediment onto public roadways and to minimize disturbance of vegetation.

Where
- Stabilized construction entrances shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must be routed over the rock ingress/egress corridor.

How
1. Stabilized construction access road should be established at the onset of the construction activities and maintained in place for the duration of the construction project.
2. Installation of this practice should be the responsibility of the site clearing or excavating contractor.
3. Access location should be cleared of woody vegetation.
4. Non-woven geotextile fabric shall be placed over the existing ground prior to placing stone.
5. Access size should be a minimum of 50'. (30' for single residence lot).
6. Access width should be 12' minimum, flared at the existing road to provide a turning radius.
7. Crushed aggregate (2" to 3"), or reclaimed or recycled concrete equivalent, shall be placed at least 8" deep over the length and width of the ingress/egress corridor.

Maintenance
- Periodic inspection and needed maintenance shall be provided after each rain event.
- Stabilized entrances shall be repaired and rock added as necessary.

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

S58 INLET PROTECTION – FABRIC DROP SPECIFICATIONS

When
- When sediment laden stormwater requires treatment before entering a stormwater drainage system.

Why
- To prevent sediment from entering stormwater systems.

Where
- Use in or at stormwater inlets, especially at construction sites or in streets.

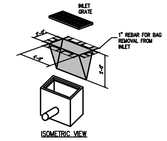
How
1. A filter fabric bag is hung inside the inlet, beneath the grate.
2. Replace grate, which will hold bag in place.
3. Anchor filter bag with 1" rebar for removal from inlet.
4. Flaps of bag that extend beyond the bag can be buried in soil in earth areas.

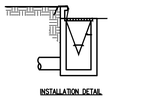
Maintenance
- Drop inlet filters should be inspected routinely and after each major rain event.
- Damaged filter bags should be replaced.
- Clean and/or replace filter bag when 1/2 full.
- Replace clogged fabric immediately.
- If needed, initiate repairs immediately upon inspection.
- Remove entire protective mechanism when upgradient areas are stabilized and streets have been swept.

Limitations
- Can only accommodate small flow quantities.
- Requires frequent maintenance.
- Ponding may occur around storm drains if filter is clogged.

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

S58 INLET PROTECTION – FABRIC DROP





Note
- Inlet protection fabric drop shall be non-black in color.
- Shall have the contractor's name attached.
- Shall have overflow.

STANDARD SYMBOL

MICHIGAN DEPARTMENT OF MANAGEMENT AND BUDGET

BERGMANN
ARCHITECTS ENGINEERS PLANNERS

7050 West Saginaw Hwy.
Suite 200
Lansing, MI 48917

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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
04/21/2023	SCHEMATIC DESIGN PACKAGE
05/26/2023	DESIGN DEVELOPMENT PACKAGE
05/31/2023	SITE PLAN REVIEW
06/22/2023	OWNER REVIEW
09/18/2023	BID & PERMITS

Note:
Unauthorized alteration or addition to this drawing is a violation of the New York State Education Law Article 145, Section 7209.

Project Manager: B.HUYLER
Checked By: P. FURTAW, PE
Designed By: J.ARSENEAULT
Drawn By: J.ARSENEAULT
Date Issued: 9/18/2023
Project Number: 23005898A

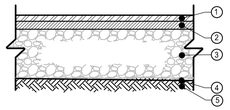
SESC DETAILS

Drawing Number:

C311

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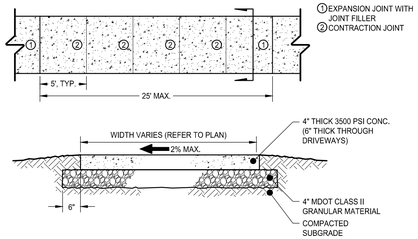
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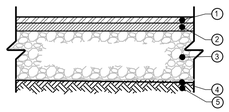


1. 2" HMA, MDOT 5EL WEARING COURSE
2. 2" HMA, MDOT 4EML LEVELING COURSE
3. 10" AGGREGATE BASE, MDOT 21AA CRUSHED NATURAL AGGREGATE OR CRUSHED CONCRETE
4. TENSOR TX140 GEOGRID AS REQUIRED
5. COMPACTED, PROOFROLLED AND APPROVED SUBGRADE

NOTES:
1. ASPHALT BINDER GRADE PG58-28 SHOULD BE USED.
2. RECLAIMED ASPHALT PAVEMENT (RAP) SHOULD BE MAINTAINED WITHIN MDOT TIER 1 (0 TO 17 PERCENT RAP BINDER BY WEIGHT) FOR WEARING COURSE, AND MDOT TIER 2 (18 TO 27 PERCENT RAP BINDER BY WEIGHT) FOR LEVELING COURSE MICTURES.
3. GEOGRID LAYER CAN BE OMITED IN AREAS THAT PASS A PROOFROLL (½ INCH CRITERIA) AND UNDERLAYING FILL DOESN NOT CONTRAIN DEBRIS OR DELERERIOUS MATERIALS.
4. CRUSHED CONCRETE OR MDOT 22A AGGREGATE SHOULD NOT BE SUBSTITUTED FOR THE RECOMMENDED CRUSHED AGGREGATE BASE WITHOUT A 25 PERCENT INCREASE OF THE THICKNESS OF THE AGGREGATE BASE TO ACCOUNT FOR THE LOWER QUALITY OF THOSE MATERIALS.

A2 LIGHT-DUTY HMA PAVEMENT SECTION
N.T.S.

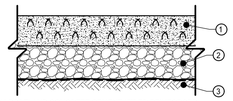




1. 2" HMA, MDOT 5E1 WEARING COURSE
2. 3" HMA, MDOT LVSP LEVELING COURSE
3. 8" AGGREGATE BASE, MDOT 21AA CRUSHED NATURAL AGGREGATE
4. TENSOR TX140 GEOGRID AS REQUIRED
5. COMPACTED, PROOFROLLED AND APPROVED SUBGRADE

NOTES:
1. ASPHALT BINDER GRADE P658-28 SHOULD BE USED IN PRODUCTION OF THE HEAVY DUTY ASPHALT PAVEMENT.
2. RECLAIMED ASPHALT PAVEMENT (RAP) SHOULD BE MAINTAINED WITHIN MDOT TIER 1 (0 TO 17 PERCENT RAP BINDER BY WEIGHT) FOR WEARING COURSE, AND MDOT TIER 2 (18 TO 27 PERCENT RAP BINDER BY WEIGHT) FOR LEVELING COURSE MICTURES.
3. GEOGRID LAYER CAN BE OMITED IN AREAS THAT PASS A PROOFROLL (½ INCH CRITERIA) AND UNDERLAYING FILL DOESN NOT CONTRAIN DEBRIS OR DELERERIOUS MATERIALS.
4. CRUSHED CONCRETE OR MDOT 22A AGGREGATE SHOULD NOT BE SUBSTITUTED FOR THE RECOMMENDED CRUSHED AGGREGATE BASE WITHOUT A 25 PERCENT INCREASE OF THE THICKNESS OF THE AGGREGATE BASE TO ACCOUNT FOR THE LOWER QUALITY OF THOSE MATERIALS.

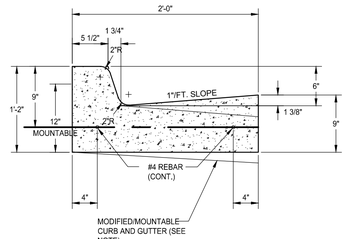
A3 HEAVY-DUTY HMA PAVEMENT SECTION
N.T.S.



1. 8" PORTLAND CONCRETE CEMENT (FIBER REINFORCED)
2. 6" GRADED AGGREGATE BASE COURSE WELL GRADED CRUSHED STONE
3. COMPACTED, PROOFROLLED AND APPROVED SUBGRADE

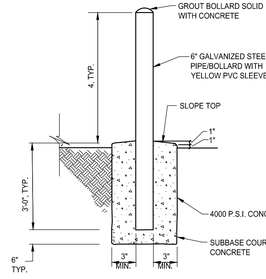
NOTES:
1. COMPACT SUBGRADE TO A MODIFIED PROCTOR DENSITY OF 95%
2. SUBBASE COURSE SHALL HAVE NO MORE THAN (7%) SEVEN PERCENT BY WEIGHT FINER THAN NO. 200 SIEVE.

A4 STANDARD CONCRETE PAVEMENT SECTION
N.T.S.

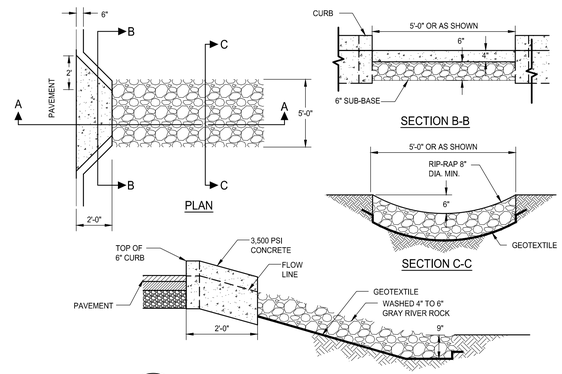


NOTE:
MODIFIED/MOUNTABLE CURB AND GUTTER SHALL BE THE SAME DETAIL BUT THE GUTTER SHALL SLOPE AWAY FROM THE CURB FACE @ 1"/FT.

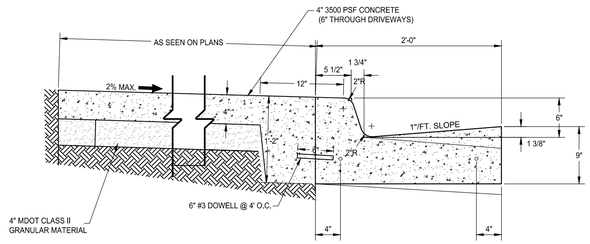
A6 MDOT F-4 CURB & GUTTER DETAIL
N.T.S.



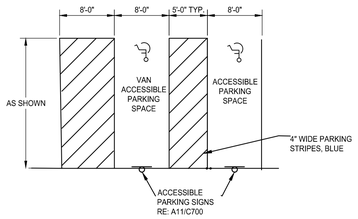
A7 6" GALV. STEEL PIPE BOLLARD DETAIL
N.T.S.



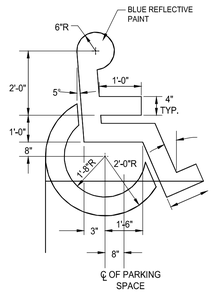
A8 RIPRAP SPILLWAY DETAIL
N.T.S.

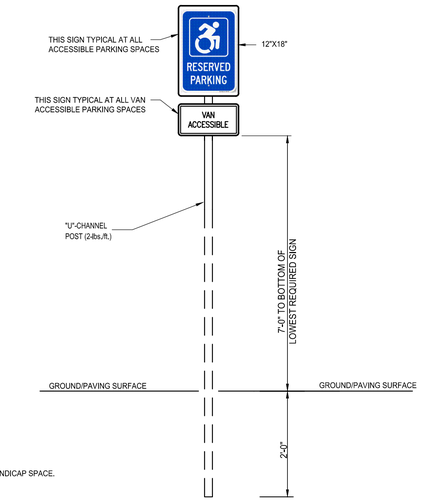


A5 CONCRETE SIDEWALK DETAIL
N.T.S.



A9 STD & ACCESSIBLE PARK SPACES
NTS





NOTES

1. ONE AT EACH HANDICAP SPACE.

A11 ACCESSIBLE PARK SIGN DETAIL
NTS

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Designed By: J.ARSENEAULT	Drawn By: J.ARSENEAULT
Date Issued: 9/18/2023	Project Number: 23005898A

MISCELLANEOUS DETAILS

Drawing Number:

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FOUNDATION

1. FOUNDATION DESIGN IS BASED ON GEOTECHNICAL REPORT, DATED APRIL 6, 2023 AND ADDENDA PREPARED BY SME GEOTECHNICAL ENGINEERS, INC. REPORT #092228.00. SOIL BEARING PRESSURE NOT TO EXCEED 2500 PSF FOR FOOTINGS WITHIN BUILDING FOOTPRINT. REFER TO GEOTECHNICAL REPORT FOR ALL PROJECT REQUIREMENTS PERTAINING TO EARTHWORK, INCLUDING BUT NOT LIMITED TO, EXCAVATION, BACKFILLING, COMPACTION, AND MATERIALS.
2. FOUNDATION SYSTEM - CONCRETE WALLS, COLUMN PIERS, SLABS-ON-GRADE AND SPREAD FOOTINGS.
3. EXTERIOR CONSTRUCTION SHALL BE FOUNDED BELOW FINISHED GRADE AT A MINIMUM DEPTH OF 3'-6", UNLESS NOTED OTHERWISE.
4. FOUNDATION UNITS SHALL BE CENTERED UNDER SUPPORTED STRUCTURAL MEMBERS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
5. REFER TO THE GEOTECHNICAL REPORT FOR ACCEPTABLE FOUNDATION BACKFILL AND SLAB-ON-GRADE SUBGRADE REQUIREMENTS. DO NOT PLACE FILL UNTIL SUBMITTAL FOR FILL MATERIAL IS APPROVED BY ENGINEER.
6. PLACE BACKFILL AND FILL MATERIALS IN HORIZONTAL LAYERS NOT MORE THAN 8" IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HEAVY COMPACTION EQUIPMENT, AND NOT MORE THAN 6" IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND-OPERATED TAMPERS.
7. ALL FOUNDATION ELEMENTS ARE TO BE PLACED ON UNDISTURBED APPROVED NATIVE SOIL OR ON 1'-0" MINIMUM APPROVED COMPACTED STRUCTURAL FILL. STRUCTURAL FILL SHALL EXTEND 1'-0" MINIMUM BEYOND THE FOUNDATION ELEMENT AND THEN DOWNWARD TO NATURAL SOILS AT A SLOPE OF 2 HORIZ. TO 1 VERT.
8. BACKFILL AND FILL MATERIALS SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY ACCORDING TO THE MODIFIED PROCTOR TEST (ASTM D-1557).
9. BACKFILL AGAINST FOUNDATION WALLS BELOW GRADE SO THAT THE DIFFERENCE IN THE FILL LEVEL ON OPPOSITE SIDES OF THE WALL DOES NOT EXCEED 1'-0" AT ANY TIME.
10. EACH PRIME CONTRACTOR SHALL PROVIDE ALL TRENCHING WORK REQUIRED FOR ITS CONTRACT, INCLUDING TRENCH EXCAVATION, AND BACKFILL (WITH ACCEPTABLE FILL, SEE GEOTECHNICAL REPORT) TO WITHIN 1'-0" OF FINISH GRADE/FLOOR. ALL TRENCHING WORK WITHIN THE BUILDING FOOTPRINT SHALL BE COORDINATED WITH THE GENERAL CONTRACTOR. GENERAL CONTRACTOR MUST ACCEPT, IN WRITING, THE QUALITY OF THE TRENCH BACKFILL OF OTHER PRIME CONTRACTORS BEFORE BEGINNING WORK OVER THE TOP OF THE TRENCH.
11. EXCAVATION AND BACKFILL OPERATIONS SHALL BE MAINTAINED IN A DRY CONDITION. SURFACE AND INFILTRATING WATER SHALL BE REMOVED BY SITE GRADING AND PUMPING FROM SUMPS AS REQUIRED.
12. NO FOUNDATION CONCRETE SHALL BE PLACED IN WATER OR ON FROZEN SUBGRADE MATERIAL.
13. PROTECT IN-PLACE FOUNDATIONS AND SLABS FROM FROST PENETRATION UNTIL THE PROJECT IS COMPLETED.
14. THE CONTRACTOR IS RESPONSIBLE FOR EXCAVATION SAFETY. EXCAVATIONS MUST BE PERFORMED IN ACCORDANCE WITH THE CURRENT OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS.
15. PROVIDE TEMPORARY OR PERMANENT SUPPORTS WHETHER SHORING, SHEETING OR BRACING SO THAT NO HORIZONTAL MOVEMENT OR VERTICAL SETTLEMENT OCCURS TO EXISTING STRUCTURES, STREETS OR UTILITIES ADJACENT TO THE PROJECT SITE.

CONCRETE REINFORCEMENT

1. DETAILING, FABRICATION, AND INSTALLATION OF REINFORCEMENT SHALL CONFORM TO ACI-318 *"BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE,"* AND THE MOST RECENT ADDITIONS OF SP-66 *"ACI DETAILING MANUAL"* AND THE CRSI *"MANUAL OF STANDARD PRACTICE."*
2. STEEL REINFORCEMENT, UNLESS NOTED OTHERWISE, SHALL CONFORM TO THE FOLLOWING:
   BARS, TIES, AND STIRRUPS ASTM A615 GRADE 60 (MIN. YIELD STRESS F_Y = 60 KSI)
   WELDED WIRE FABRIC (WWF) ASTM A185
3. CONTRACTOR SHALL SUBMIT REBAR SHOP DRAWINGS FOR APPROVAL. PROVIDE AND SCHEDULE ON SHOP DRAWINGS THE NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION.
4. ALL REINFORCEMENT SHALL BE SECURELY HELD IN PLACE WHILE PLACING CONCRETE. IF REQUIRED, ADDITIONAL BARS, STIRRUPS, OR CHAIRS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT FOR ALL BARS.
5. MAXIMUM OF 4'-0" OC SPACING FOR CHAIRS IN SLABS
6. MINIMUM CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT, UNLESS NOTED OTHERWISE, SHALL BE AS FOLLOWS:
   - UNFORMED SURFACES CAST AGAINST AND PERMANENTLY IN CONTACT WITH EARTH 3.0"
   - FORMED SURFACES IN CONTACT WITH EARTH OR EXPOSED TO WEATHER
     - #6 THROUGH #18 BARS 2.0"
     - #5 BARS, 5/8" WIRE AND SMALLER 1.5"
   - FORMED SURFACES NOT IN CONTACT WITH EARTH OR EXPOSED TO WEATHER
     WALLS, SLABS, JOISTS
     - #14 AND #18 BARS 1.5"
     - #11 BARS AND SMALLER 1.0"
   - BEAMS, GIRDERS AND COLUMNS:
     PRINCIPAL REINFORCEMENT, TIES, STIRRUPS OR SPIRALS 1.5"
7. WHERE CONTINUOUS REINFORCEMENT IS SPECIFIED IT SHALL BE EXTENDED CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS. LAP SHALL BE CLASS B TENSION LAP SPLICES PER ACI 318, UNLESS NOTED OTHERWISE ON PLANS. STAGGER REINFORCING LAP SPLICES A MINIMUM OF 6 FEET.
8. REINFORCEMENT SHALL BE CONTINUOUS THROUGH THE FOLLOWING, UNLESS NOTED OTHERWISE:
   - CONSTRUCTION JOINTS
   - FOUNDATION WALL REINFORCEMENT SHALL BE CONTINUOUS THROUGH COLUMN PIERS
   - WALL FOOTING REINFORCEMENT SHALL BE CONTINUOUS THROUGH COLUMN FOOTINGS
9. WHERE REINFORCEMENT IS NOT SHOWN ON DRAWINGS PROVIDE REINFORCEMENT IN ACCORDANCE WITH APPLICABLE DETAILS AS DETERMINED BY THE ARCHITECT. IN NO CASE SHALL REINFORCEMENT BE LESS THAN THE MINIMUM REINFORCEMENT PERMITTED BY THE APPLICABLE CODES.
10. WHERE REINFORCEMENT IS REQUIRED IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.
11. DOWELS FROM FOOTINGS INTO WALLS AND PIERS SHALL MATCH BAR SIZE AND NUMBER, UNLESS NOTED OTHERWISE.
12. WELDED WIRE FABRIC
    - SHALL BE IN FLAT SHEETS
    - LAP SHEETS ONE AND ONE-HALF SPACES (6" MINIMUM) AND WIRE TOGETHER AT 3'-0" OC MAX.
    - SUPPORT SHEETS WITH APPROVED SLAB BOLSTERS OR CHAIRS AT NOT MORE THAN 4'-0" OC IN EACH DIRECTION AT THE PROPER ELEVATION.
    - SEE NOTES, TYPICAL DETAILS AND PLANS FOR MATERIAL, SIZE AND LOCATION.
13. REINFORCEMENT SHALL NOT BE TACK WELDED.
14. PROVIDE 2 - #4 x 3'-0" LONG TOP BARS AT ALL RE-ENTRANT CORNERS IN SLAB-ON-GRADE CONSTRUCTION.
15. PROVIDE ADDITIONAL #4 x 6'-0" LONG TOP BARS OVER ALL GIRDERS AT 2'-0" OC ON ALL ELEVATED SLABS ON DECK.
16. INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AND A FIELD REPRESENTATIVE SHALL BE INFORMED A MINIMUM OF 24 HOURS IN ADVANCE OF CONCRETE PLACEMENT, TO ALLOW FOR INSPECTION OF THE REINFORCING STEEL.

CAST-IN-PLACE CONCRETE

1. CAST-IN-PLACE CONCRETE WORK SHALL CONFORM TO THE ACI-318 *"BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"* AND ACI 301 *"SPECIFICATIONS FOR STRUCTURAL CONCRETE."*
2. ALL CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED AND PLACED IN THE PRESENCE OF A REPRESENTATIVE OF AN APPROVED TESTING AGENCY.
3. PRIOR TO PLACEMENT OF CONCRETE, A FIELD REPRESENTATIVE SHALL BE INFORMED A MINIMUM OF 24 HOURS IN ADVANCE OF PLACEMENT, TO ALLOW FOR INSPECTION OF REINFORCING STEEL, AND PREPARATION FOR TAKING CONCRETE SAMPLES. INDEPENDENT TESTING IS REQUIRED FOR ALL CONCRETE PLACEMENTS. CONCRETE TO BE SAMPLE IN ACCORDANCE WITH ACI 318 AND APPLICABLE ASTM TESTING PROCEDURES. QUANTITY OF SPECIMENS, FREQUENCY OF SAMPLING AND CYLINDER COMPRESSION TESTING SCHEDULE TO BE DETERMINED BY ACI 318, OWNERS REQUIREMENTS, AND / OR LOCAL JURISDICTION REQUIREMENTS, WHICHEVER IS MORE STRINGENT.
4. UNLESS NOTED OTHERWISE, STRUCTURAL CONCRETE SHALL HAVE THE FOLLOWING STRENGTH, AND DURABILITY REQUIREMENTS:

TYPE	EXPOSURE CLASS F	S	W	C	AIR CONTENT	MIN. 28 DAY COMP. STRENGTH	MAX W/C RATIO
INT. SLAB-ON-GRADE	F0	S0	W0	C0	1.0% - 3.0%	4000 PSI	0.50
INT. ELEVATED SLAB-ON-DECK	F0	S0	W0	C0	1.0% - 3.0%	3500 PSI	0.50
EXT. SLAB-ON-GRADE	F3	S0	W0	C2	4.5% - 7.5%	5000 PSI	0.40
PIERS/FDN/RETAINING WALLS	F2	S0	W0	C1	4.5% - 7.5%	4500 PSI	0.45
FOOTINGS	F0	S1	W0	C1	1.0% - 3.0%	4000 PSI	0.50

5. ALL CONCRETE EXPOSED TO THE WEATHER IN THE FINISHED PROJECT SHALL BE AIR ENTRAINED PER ACI 318 BASED ON AGGREGATE SIZE, OR PER EXPOSURE CLASS, WHICHEVER IS MORE STRINGENT.
6. UNLESS NOTED OTHERWISE, ALL CONCRETE SHALL BE NORMAL WEIGHT CONCRETE (144 PCF +/-) WITH ALL CEMENT CONFORMING TO ASTM C150, TYPE I / II. MAXIMUM AGGREGATE SIZE SHALL BE 1-1/2" FOR FOOTINGS AND 3/4" FOR WALLS AND SLABS, CONFORMING TO ASTM C33. WHEN NOTED, LIGHT WEIGHT CONCRETE (110 PCF +/- 5) SHALL BE PROVIDED WITH ALL CEMENT CONFORMING TO ASTM C150, TYPE I / II. MAXIMUM AGGREGATE SIZE SHALL BE 3/4" AND CONFORM TO ASTM C330.
7. CONTRACTOR SHALL SUBMIT A CONCRETE MIX DESIGN IN ACCORDANCE WITH ACI 318 FOR EACH TYPE OF CONCRETE APPLICABLE TO THE PROJECT PRIOR TO THE PLACEMENT OF CONCRETE FOR APPROVAL. THE ADDITION OF WATER AT THE PLANT OR IN THE FIELD GREATER THAN THE SPECIFIED WATER CONTENT IS PROHIBITED. ADMIXTURE PRODUCT DATA SHALL BE SUBMITTED FOR APPROVAL.
8. THE USE OF HIGH EARLY STRENGTH CONCRETE MAY BE REQUESTED BY THE CONTRACTOR. MIX DESIGN DATA USING FIELD CURED SPECIMENS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL.
9. ALL FORMWORK TO BE CONSTRUCTED IN ACCORDANCE WITH ACI-347 "GUIDE TO FORMWORK FOR CONCRETE" WITHIN TOLERANCE LIMITS DEFINED IN ACI-117 "SPECIFICATION FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS."
10. CONCRETE FOR FOOTINGS IS TO BE POURED ON THE SAME DAY AS THE SUBGRADE PREPARATION IS APPROVED BY THE INDEPENDENT INSPECTION AGENCY / GEOTECHNICAL ENGINEER.
11. CONCRETE SHALL NOT BE POURED OVER STANDING WATER, SATURATED OR FROZEN SOILS.
12. STRUCTURAL STEEL BELOW GRADE SHALL BE ENCASED IN CONCRETE WITH A MINIMUM COVER OF 2".
13. REVIEW ALL ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR LOCATIONS AND ELEVATIONS OF ALL SLAB PENETRATIONS, FLOOR DRAINS, EQUIPMENTS PADS, TRENCHES, CHASES, ANCHOR RODS, ETC. ALL SLOTS, SLEEVES AND OTHER EMBEDDED ITEMS SHALL BE SET BEFORE CONCRETE IS PLACED. REFER TO APPLICABLE DRAWINGS FOR SIZES AND LOCATIONS.
14. PLUMBING LINES AND ELECTRICAL CONDUITS ARE TO BE PLACED BELOW (NOT WITHIN) THE SLAB ON GRADE. VERTICAL PENETRATIONS ARE PERMITTED.
15. UTILITY PIPING SHALL NOT PASS THROUGH FOOTINGS. TOP OF UTILITY PIPING MUST BE ATLEAST 12" BELOW BOTTOM OF WALL FOOTINGS OR ABOVE OR OTHERWISE FOOTINGS MUST BE LOWERED. COORDINATE LOCATIONS WITH CIVIL AND MEP DRAWINGS. ALL PIPE PENETRATIONS THROUGH FOUNDATION WALLS SHALL BE SLEEVED. PROVIDE SCHEDULE 40 PVC PIPE SLEEVES TWO SIZES LARGER THAN PROPOSED PIPE OR CONDUIT. DO NOT CUT OR BEND MAIN REINFORCING STEEL AT SLEEVE LOCATIONS
16. OPENINGS IN SLABS AND WALLS LESS THAN 12" Ø ROUND OR 12" SQUARE ARE GENERALLY NOT SHOWN ON THE STRUCTURAL DRAWINGS. OPENINGS SHOWN ON STRUCTURAL DRAWINGS SHALL NOT BE REVISED WITHOUT PRIOR WRITTEN APPROVAL OF THE EOR.
17. ANY CUTTING/CORING OF CONCRETE IS PROHIBITED UNLESS APPROVED BY THE EOR.
18. PROVIDE WATERSTOPS AT ALL HORIZONTAL AND VERTICAL CONCRETE JOINTS WHERE INDICATED ON DRAWINGS AND DETAILS. WATERSTOPS SHALL BE A HYDROPHLLIC STRIP WATERSTOP WITH A MINIMUM CLEAR COVER OF 3 INCHES. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR ADDITIONAL INFORMATION.
19. CONTRACTOR SHALL PROVIDE THE FOLLOWING CONTRACTION AND ISOLATION JOINTS IN SLABS ON GRADE.
    - ISOLATION JOINTS AT COLUMNS SHALL BE 1/2" PREFORMED JOINT FILLER, DIAMOND SHAPED, AS INDICATED ON THE TYPICAL DETAILS.
    - UNLESS NOTED OTHERWISE ON DRAWINGS, PROVIDE CONTRACTION JOINTS AT COLUMN LINES AND ADDITIONALLY AS REQUIRED SO THAT THE SPACING DOES NOT EXCEED 12 FEET AND THE AREA BOUNDED BY JOINTS LENGTH TO WIDTH RATIO NOT EXCEED 1.5 TO 1.
    - BEGIN SAW CUTTING ONCE CONCRETE HAS HARDENED SUFFICIENTLY TO PREVENT DISLODGEMENT OF AGGREGATES. SAW CUTS ARE TO BE 1/4 SLAB DEPTH (1" MINIMUM) AND SHALL BE MADE WITHIN 12 HOURS OF PLACING THE SLAB.
    - AFTER CONCRETE PLACED FOR SLABS INSIDE THE BUILDING HAS CURED AND IS READY FOR PLACEMENT OF FLOOR FINISHES, ALL CONTROL JOINTS SHALL BE FILLED WITH AN APPROVED JOINT FILLER.
20. PROVIDE CONSTRUCTION AND CONTROL JOINTS IN CONCRETE WALLS AS FOLLOWS UNLESS OTHERWISE INDICATED:
    - FOUNDATION WALLS - 25'-0" (MAX)
    - BASEMENT FOUNDATION WALLS
      A. 8'-0" OR LESS - WALL HEIGHT x 3 (MAX)
      B. 8'-1" TO 11'-11 - 25'-0" (MAX)
      C. 12'-0" OR GREATER - WALL HEIGHT x 1 (MAX)
    - DO NOT PLACE WITHIN 5 FEET OF A PIER, CORNER, INTERSECTIONS, AND ENDS.
    - COORDINATE JOINT LOCATIONS WITH BRICK VENEER CONTROL JOINT LOCATIONS, SEE ARCHITECTURAL DRAWINGS.
21. PROVIDE CONTRACTION AND ISOLATION JOINTS IN SLABS-ON-GRADE. ISOLATION JOINTS AT COLUMNS SHALL BE 1/2" PRE-MOLDED FILLER, DIAMOND SHAPED, AS INDICATED ON THE TYPICAL DETAILS. UNLESS NOTED OTHERWISE ON DRAWINGS, PROVIDE CONTRACTION JOINTS AT COLUMN LINES AND ADDITIONALLY AS REQUIRED SO THAT SPACING NOT EXCEED 36 x SLAB THICKNESS AND THE AREA BOUNDED BY JOINTS LENGTH TO WIDTH RATION NOT EXCEED 1.5 TO 1. SAW CUTS TO BE 1/4 x SLAB DEPTH CUT NO MORE THAN 12 HOURS AFTER CONCRETE PLACEMENT. SEE TYPICAL DETAILS.
22. PROVIDE 1/2" PREFORMED JOINT FILLER AND CAULK WHERE ALL HORIZONTAL CONCRETE SURFACES MEET ANY VERTICAL SURFACES.
23. PROVIDE 3/4" x 3/4" CHAMFER AT ALL EDGES OF EXPOSED CONCRETE COLUMNS, PIERS AND WALLS.
24. THE CONTRACTOR SHALL PROTECT THE CONCRETE FROM THE FOLLOWING IMMEDIATELY AFTER PLACEMENT:
    - PREMATURE DRYING.
    - HOT WEATHER, REFER TO ACI-305R "HOT WEATHER CONCRETING"
    - COLD WEATHER / FREEZING, REFER TO ACI-306R "COLD WEATHER CONCRETING"
25. BEGIN THE SELECTED CURING METHOD OF CONCRETE SLABS WITHIN TWO HOURS AFTER SURFACE FINISHING OPERATIONS ARE COMPLETED. CURING METHOD SHALL REMAIN IN PLACE UNTIL THE CONCRETE HAS REACHED A MINIMUM OF 75% OF THE REQUIRED 28 DAY COMPRESSIVE STRENGTH.
26. THE CONTRACTOR SHALL FINISH CONCRETE FLATWORK TO THE FOLLOWING RANDOM TRAFFIC FLOOR FINISH TOLERANCES (ACI-117 4.8.5) WHEN MEASURED IN ACCORDANCE WITH ASTM E1155:
    - SLAB ON GRADE
      SPECIFIED OVERALL F_F = 35 / F_L = 25
      MINIMUM LOCAL F_F = 21 / F_L = 15
    - ELEVATED SLAB ON DECK
      SPECIFIED OVERALL F_F = 35 / F_L = 20*
      MINIMUM LOCAL F_F = 21 / F_L = 12*

    * - LEVELNESS F-NUMBERS APPLY ONLY TO SLABS ON GRADE AND ELEVATED SLABS-ON-DECK THAT ARE SHORED AT THE TIME OF TESTING.
27. ON STEEL FRAMED FLOORS, PROVIDE ADDITIONAL CONCRETE AS NECESSARY TO FINISH THE FLOORS TO WITHIN SPECIFIED TOLERANCES WHILE ACCOUNTING FOR STEEL DECK AND STEEL BEAM DEFLECTIONS. ALLOW FOR AN AVERAGE OF AT LEAST 1/2 INCH EXTRA OF CONCRETE FOR EACH FLOOR.

STRUCTURAL DESIGN CRITERIA

1. GOVERNING CODES
   a. BUILDING CODE — 2015 INTERNATIONAL BUILDING CODE
   b. GENERAL DESIGN LOADS — ASCE 7-10
   c. CONCRETE — ACI 318-14
   d. STEEL FRAMING — AISC 360-16 & AISC 341-10
   e. COLD-FORMED STEEL FRAMING MASONRY — AISI S100-12; TMS 402-2013
2. RISK CATEGORY — III
3. DEAD LOADS
   a. ROOF
      - ROOFING AND INSULATION 3 PSF
      - 1 1/2" STEEL ROOF DECK 3 PSF
      - STEEL FRAMING 6 PSF
      - EQUIPMENT PER PLAN
      - MEP 3 PSF
      - MISCELLANEOUS 3 PSF
      - TOTAL ROOF DEAD LOAD 18 PSF
4. LIVE LOADS
   a. ROOF 20 PSF
   b. SLAB-ON-GROUND 100 PSF
5. SNOW LOADS
   a. GROUND SNOW LOAD, Pg 30 PSF
   b. FLAT ROOF SNOW LOAD, Pf 23 PSF
   c. EXPOSURE FACTOR, Ce 1.0
   d. THERMAL FACTOR, Ct 1.0
   e. IMPORTANCE FACTOR, Is 1.1
   f. SLOPE FACTOR, Cs 1.0
   g. SNOW DRIFT LOAD:
      - DRIFT SURCHARGE LOAD PER ASCE 7-10 NOTED ON S010 WHERE APPLICABLE.
6. WIND LOADS
   a. WIND VELOCITY, V_{ULT} — 120 MPH
   b. EXPOSURE CATEGORY — C
   c. INTERNAL PRESSURE COEFFICIENT — (ENCLOSED)
1. SEISMIC DESIGN DATA
   a. SEISMIC DESIGN CATEGORY — B
   b. SEISMIC IMPORTANCE FACTOR — 1.25
   c. SEISMIC SITE CLASS (SOILS) — D
   d. SEISMIC RESISTING SYSTEM
      - STRUCTURAL STEEL SYSTEMS NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE EXCLUDING CANTILEVER COULM SYSTEM.
   e. RESPONSE MODIFICATION FACTOR — 3.0
   f. DEFLECTION AMPLIFICATION FACTOR — 3.0
   g. EARTHQUAKE SPECTRAL RESPONSE
      - ACCELERATION AT SHORT PERIODS — S_s = 0.083
   h. EARTHQUAKE SPECTRAL RESPONSE
      - ACCELERATION, PERIOD = 1 SECOND — S_1 = 0.045
   i. DESIGN 5% DAMPED, SPECTRAL RESPONSE
      - ACCELERATION AT SHORT PERIODS — S_{DS} = 0.088
   j. DESIGN 5% DAMPED, SPECTRAL RESPONSE
      - ACCELERATION, PERIOD = 1 SECOND — S_{D1} = 0.021W
   k. SEISMIC BASE SHEAR — V = CS x W_s
   l. ANALYSIS PROCEDURE — EQUIVALENT LATERAL FORCE PROCEDURE

GENERAL

1. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THE GOVERNING LOCAL MUNICIPAL CODES AND SPECIFICATIONS (INCLUDING SUPPLEMENTS) FOR THIS TYPE OF CONSTRUCTION. THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE [WITH THE GOVERNING CODES AND REFERENCED STANDARDS LISTED BELOW]
2. THE STRUCTURAL DRAWINGS ARE INTENDED TO BE USED IN CONJUNCTION WITH THE ARCHITECTURAL DRAWINGS AND ALL OTHER APPLICABLE DISCIPLINE DRAWINGS. ANY CONFLICT BETWEEN NOTES, DETAILS, AND SPECIFICATIONS, THE MOST RIGID REQUIREMENTS SHALL GOVERN.
3. THE CONTRACTOR SHALL NOT MAKE DEVIATIONS FROM THE DESIGN DOCUMENTS WITHOUT WRITTEN APPROVAL FROM THE ENGINEER OF RECORD (EOR). CHANGES BY THE CONTRACTOR, DUE TO CONTRACTOR PROPOSED ALTERNATIVES OR TO CORRECT CONTRACTOR ERRORS/OMISSIONS, MUST BE SUBMITTED TO THE EOR FOR APPROVAL. THE CONTRACTOR IS RESPONSIBLE FOR ALL COSTS INCLUDING ENGINEERING FEES FOR REVIEW, OBSERVATIONS, STRUCTURAL CALCULATIONS, AND REVISIONS. THE CONTRACTOR SHALL ALSO PROCESS THE REVISED PLANS REFLECTING ALL SUBSTITUTIONS THROUGH THE APPROPRIATE OFFICE OF ALL GOVERNING AGENCIES.
4. THE STRUCTURE IS DESIGNED AS SELF SUPPORTING AFTER THE BUILDING IS FULLY COMPLETED. THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION METHODS, PROCEDURES AND SEQUENCES, UNLESS SPECIFICALLY INDICATED ON THE DRAWINGS. TEMPORARY BRACING, SHEETING, SHORING/ETC., TO ENSURE THE STRUCTURAL STABILITY OF THE NEW STRUCTURE, EXISTING STRUCTURES, SIDEWALKS, AND UTILITIES, IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER REGISTERED IN THE LOCAL JURISDICTION. LOADS GREATER THAN THE INDICATED DESIGN LIVE LOADS SHALL NOT BE PLACED ON THE STRUCTURE. ALL CONSTRUCTION PROCESSES SHALL MEET ALL APPLICABLE OSHA REQUIREMENTS.
5. CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE ENGINEER FREE AND HARMLESS OF ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THE PROJECT, EXCEPT FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE ENGINEER.
6. ALL SECTIONS AND DETAILS, WHETHER EXPLICITLY CUT ON PLAN OR NOT, SHALL BE CONSIDERED TYPICAL AND SHALL APPLY AT SIMILAR CONDITIONS. SIGNIFICANT ADJUSTMENTS ACCOUNTING FOR VARYING CONDITIONS IN THE FIELD SHOULD BE SUBMITTED TO EOR FOR APPROVAL AND BE RESOLVED PRIOR TO BEGINNING WORK.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK AND COORDINATION INVOLVED TO PROVIDE OPENINGS, CHASES, EQUIPMENT PADS, HANGERS, INSERTS, SLEEVES, ETC. INDICATED ON ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING DRAWINGS. OPENINGS SHOWN ON THE STRUCTURAL DRAWINGS SHALL NOT BE REVISED WITHOUT APPROVAL FROM THE EOR
8. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL DIMENSIONS AND INFORMATION NOT SHOWN. WORKING DIMENSIONS SHALL NOT BE SCALED FROM STRUCTURAL PLANS, SECTIONS, OR DETAILS. ANY REFERENCE TO WATERPROOFING AND FIREPROOFING ON THE STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY, SEE ARCHITECTURAL DRAWINGS FOR SPECIFIC REQUIREMENTS.
9. CONTRACTOR SHALL VISIT THE SITE AND VERIFY EXISTING CONDITIONS AND UTILITIES PRIOR TO STARTING ANY CONSTRUCTION. [STRUCTURAL MEMBER INFORMATION INDICATED AS EXISTING (EXST.) ON DRAWINGS WAS OBTAINED DURING LIMITED FIELD OBSERVATIONS AND/OR FROM LIMITED DRAWINGS IF AVAILABLE. ACTUAL CONDITIONS MAY DIFFER FROM THAT WHICH IS INDICATED ON PLAN. IF FIELD CONDITIONS VARY FROM THOSE SHOWN ON CONTRACT DOCUMENTS, THE CONTRACTOR IS TO CONTACT THE ARCHITECT IMMEDIATELY. ALL FIELD DIMENSIONS ARE TO BE VERIFIED AND NOTED AS SUCH ON SHOP DRAWING PRIOR TO FABRICATION OF ANY NEW STRUCTURAL MEMBERS.]
10. THESE DRAWINGS DO NOT DEFINE THE ENTIRE SCOPE OF THE CONTRACTOR OR SUBCONTRACTOR CONTRACTS. REFER TO ALL APPLICABLE ARCHITECTURAL, STRUCTURAL, AND OTHER DISCIPLINE DRAWINGS AS REQUIRED.

ABBREVIATIONS

@	AT	LBS	POUNDS
		LG	LONG
A=	AXIAL FORCE	LL	LIVE LOAD
AB	ANCHOR BOLT	LLH	LONG LEG HORIZONTAL
ABV	ABOVE	LLV	LONG LEG VERTICAL
ADJ	ADJACENT	LS	LONG SLOTTED
ADJST	ADJUSTABLE	LSH	LONG SIDE HORIZONTAL
AESS	ARCHITECTURALLY EXPOSED STRUCTURAL STEEL	LSV	LONG SIDE VERTICAL
		LVL	LAMINATED VENEER LUMBER
AFF	ABOVE FINISHED FLOOR	LW	LIGHT WEIGHT
ALT	ALTERNATE		
ALUM	ALUMINUM	MAX	MAXIMUM
APPROX	APPROXIMATE	MC	MISCELLANEOUS CHANNEL
ARCH	ARCHITECTURAL	MCJ	MASONRY CONTROL JOINT
		MECH	MECHANICAL
B/	BOTTOM OF	MEMB	MEMBRANE
B/W	BETWEEN	MEP	MECHANICAL, ELECTRICAL, PLUMBING
BLDG	BUILDING		
BLK	BLOCKING	MFR	MANUFACTURER
BM	BEAM	MIN	MINIMUM
BOC	BOTTOM OF CONCRETE	MISC	MISCELLANEOUS
BOT	BOTTOM	MO	MASONRY OPENING
BRG	BEARING	MTL	METAL
C	CHANNEL	NIC	NOT IN CONTRACT
C=	COMPRESSION FORCE	NTS	NOT TO SCALE
CIP	CAST IN PLACE	NW	NORMAL WEIGHT
CJ	CONTROL JOINT		
CJP	COMPLETE JOINT PENETRATION	OC	ON CENTER
		OD	OUTSIDE DIAMETER
CL	CENTER LINE	OPNG	OPENING
CLG	CEILING	OPP	OPPOSITE
CLR	CLEAR	OSB	ORIENTED STRAND BOARD
CMU	CONCRETE MASONRY UNIT		
COL	COLUMN	PAF	POWDER ACTUATED FASTENER
CONC	CONCRETE		
CONN	CONNECTION	PC	PRECAST
CONT	CONTINUOUS	Pd	DRIFTED SNOW LOAD
COORD	COORDINATE	PEMB	PRE ENGINEERED METAL BUILDING
CY	CUBIC YARD		
		Pf	FLAT ROOF SNOW LOAD
DBL	DOUBLE	PJP	PARTIAL JOINT PENETRATION
DEG	DEGREE	PL	PLATE
DET	DETAIL	PLF	POUNDS PER LINIER FOOT
DIA - Ø	DIAMETER	PLYWD	PLYWOOD
DIAG	DIAGONAL	PMEJ	PREMOLDED EXPANSION JOINT
DIM	DIMENSION	PMF	PREMOLDED FILLER
DL	DEAD LOAD	Ps	SLOPED ROOF SNOW LOAD
DWGS	DRAWINGS	PSF	POUNDS PER SQUARE FOOT
DWL	DOWEL	PSI	POUNDS PER SQUARE INCH
		PSL	PARALLEL STRAND LUMBER
EA	EACH	PT	PRESSURE TREATED
EF	EACH FACE	PTD	PAINTED
EJ	EXPANSION JOINT		
EL	ELEVATION	R	RISER
ELEC	ELECTRICAL	R=	BEAM END SHEAR REACTION
ELEV	ELEVATOR	RD	ROOF DRAIN
EOD	EDGE OF DECK	REF	REFER - REFERENCE
EOP	EDGE OF PLATE	REINF	REINFORCING
EOR	ENGINEER OF RECORD	REQ'D	REQUIRED
EOS	EDGE OF SLAB	REV	REVISION
EQ	EQUAL	RO	ROUGH OPENING
EW	EACH WAY		
EXP	EXPANSION	SCH	SCHEDULE
EXST	EXISTING	SCL	STRUCTURAL COMPOSITE LUMBER
EXT	EXTERIOR		
		SF	SQUARE FEET
F'c	CONCRETE COMPRESSIVE STRENGTH	SIM	SIMILAR
		SOG	SLAB ON GRADE
FD	FLOOR DRAIN	SPEC	SPECIFICATIONS
FF	FINISH FLOOR	SQ	SQUARE
FLR	FLOOR	SS	STAINLESS STEEL
FND	FOUNDATION	STD	STANDARD
FT	FEET	STL	STEEL
FTG	FOOTING	STRUCT	STRUCTURAL
Fy	YIELD STRESS	SYS	SYSTEM
GA	GAUGE	T	TREAD
GALV	GALVANIZED	T&B	TOP AND BOTTOM
GB	GRADE BEAM	T/	TOP OF
GC	GENERAL CONTRACTOR	T=	TENSION FORCE
		TOBB	TOP OF BOND BEAM
HI	HIGH	TOC	TOP OF CONCRETE
HORIZ	HORIZONTAL	TOS	TOP OF STEEL
HSS	HOLLOW STRUCTURAL SECTION	TOSL	TOP OF SLAB
		TYP	TYPICA

ARCH D 24x36

CONCRETE MASONRY

1. DESIGN OF CONCRETE UNIT MASONRY SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF TMS 402 "BUILDING CODE FOR MASONRY STRUCTURES".
2. CONSTRUCTION OF CONCRETE UNIT MASONRY SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF TMS 602 "SPECIFICATION FOR MASONRY STRUCTURES".
3. ALL REINFORCED CONCRETE MASONRY UNIT SYSTEMS SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION SCHEDULE PROVIDED.
4. CONCRETE MASONRY UNITS SHALL CONFORM TO C90 AND SHALL BE NORMAL WEIGHT UNITS.
5. COMPRESSIVE STRENGTH OF MASONRY SHALL BE DETERMINED BY THE UNIT STRENGTH METHOD AS SET FORTH IN TMS 602. THE NET AREA COMPRESSIVE STRENGTH OF CONCRETE MASONRY SHALL (f'_m) SHALL BE 2000 PSI AT 28 DAYS.
6. MORTAR SHALL COMPLY WITH ASTM C270. MORTAR FOR CMU IN EXTERIOR BUILDING WALLS, BEARING WALLS, SHEAR WALLS AND MASONRY IN CONTACT WITH THE EARTH SHALL BE PORTLAND CEMENT/LIME MIX, TYPE M OR S. TYPE N MORTAR MAY BE USED FOR ALL OTHER APPLICATIONS.
7. GROUT SHALL COMPLY WITH ASTM C476. THIS MIX SHALL CONTAIN NO ADMIXTURES. GROUT SHALL BE MIXED TO A SLUMP OF 8 TO 11 INCHES AS DETERMINED BY TEST METHOD C143. ALL GROUT SHALL BE FINE GROUT. THE MINIMUM 28 DAY COMPRESSIVE STRENGTH OF GROUT SHALL EQUAL OR EXCEED f'_m. THE COMPRESSIVE STRENGTH OF GROUT SHALL BE DETERMINED IN ACCORDANCE WITH ASTM C1019.
8. STEEL REINFORCING BARS SHALL COMPLY WITH ASTM A615 GRADE 60. SHOP FABRICATE REINFORCING BARS WHICH ARE SHOWN TO BE BENT OR HOOKED.
9. ALL BOND BEAMS, REINFORCED CELLS, AND CELLS WITH EXPANSION BOLTS, EMBED PLATES, OR OTHER ANCHORS, AND ALL CELLS BELOW GRADE SHALL BE GROUTED SOLID. GROUT PROCEDURE SHALL COMPLY WITH TMS 602.
10. WIRE JOINT REINFORCEMENT, TIES AND ANCHORS SHALL COMPLY WITH ASTM A82. SHEET STEEL TIES AND ANCHORS SHALL COMPLY WITH ASTM A366. ALL MASONRY ACCESSORIES SHALL BE CORROSION RESISTANT.
11. SUBMIT SHOP DRAWINGS INDICATING SIZE, LOCATION, AND DIMENSIONS OF REINFORCING STEEL FOR ALL REINFORCED MASONRY WALLS.
12. PROVIDE REINFORCING STEEL DOWELS OF THE SAME SIZE AND SPACING AS THE VERTICAL REINFORCING FROM THE SUPPORTING STRUCTURE. DOWELS SHALL HAVE STANDARD HOOKS IN ACCORDANCE WITH ACI 318.
13. REINFORCED CONCRETE MASONRY WALLS SHALL HAVE HORIZONTAL JOINT REINFORCING SPACED AT 16" OC AND IN TWO JOINTS IMMEDIATELY ABOVE AND BELOW ALL OPENINGS, EXTENDING A MINIMUM OF 2 FEET BEYOND THE JAMB ON EACH SIDE OF THE OPENINGS, IN ADDITION TO THE REINFORCING SHOWN ON THE DETAIL DRAWINGS. ALL REINFORCING INCLUDING BOND BEAMS SHALL BREAK AT CONTROL JOINTS, EXCEPT THE TOP MOST BOND BEAM WHICH SHALL BE CONTINUOUS IN EVERY WALL.
14. PROVIDE 2-COURSE SOLID MASONRY BEARING FOR LOOSE LINTELS.
15. USE LOW LIFT GROUTING TECHNIQUE, PLACE GROUT IN LIFTS UP TO FOUR FEET. CONSOLIDATE GROUT AT THE TIME OF PLACEMENT. POURS UP TO 12" MAY BE CONSOLIDATED BY PUDDLING. POURS OVER 12" SHALL BE CONSOLIDATED BY MECHANICAL VIBRATION.
16. DO NOT APPLY UNIFORM FLOOR OR ROOF LOADING FOR AT LEAST 12 HOURS AFTER BUILDING MASONRY WALLS OR COLUMNS. DO NOT APPLY CONCENTRATED LOADS FOR AT LEAST 3 DAYS.
17. REMOVE GROUT OR MORTAR ON FACE OF MASONRY IMMEDIATELY. KEEP CAVITIES FREE FROM MORTAR DROPPINGS.
18. PROVIDE MASONRY WALL CLIPS AT THE TOP OF MASONRY WALLS WHERE INDICATED ON FRAMING PLANS.
19. PROVIDE SHORING FOR ALL HUNG AND LOOSE STEEL LINTELS. SHORE AFTER LINTEL HAS BEEN ADJUSTED AND BEFORE MASONRY HAS BEEN PLACED. MASONRY LINTELS ARE TO BE BUILT ON SHORED SUPPORTS. SHORING TO REMAIN IN PLACE FOR A MINIMUM OF THREE (3) DAYS AFTER MASONRY OVER LINTEL IS COMPLETE.
20. PROTECT MASONRY FROM FREEZING WHEN AIR TEMPERATURE IS 40 DEGREES F AND FALLING. REFER TO TMS 602 FOR COLD WEATHER CONSTRUCTION REQUIREMENTS.
21. PROTECT MASONRY FROM EXCESSIVE HEAT WHEN AIR TEMPERATURE IS 100°F AND RISING. REFER TO TMS 602 FOR HOT WEATHER CONSTRUCTION REQUIREMENTS.
22. HOT ROLLED STEEL ITEMS EMBEDDED IN MASONRY WALLS, INCLUDING STEEL LINTELS, ARE FURNISHED BY THE STEEL CONTRACTOR AND INSTALLED BY THE MASONRY CONTRACTOR, UNLESS DIRECTED OTHERWISE BY THE GENERAL CONTRACTOR. WALL REINFORCING AND TIES ARE FURNISHED AND INSTALLED BY THE MASONRY CONTRACTOR.
23. PROVIDE PLASTIC BAR POSITIONING DEVICES FOR ALL VERTICAL MASONRY REINFORCING BARS, TO ASSURE THAT BARS ARE FIRMLY HELD IN POSITION IN THE MIDDLE OF BLOCK CELLS. SPACE AT A MAXIMUM OF 4'-0" OC VERTICAL.
24. PROVIDE VERTICAL REINFORCING BARS AS INDICATED ON DRAWINGS, AND 1-#5 VERT IN FULLY GROUTED CELLS WITHIN 16" OF AN OPENING OR CORNER, AT ALL CORNERS, DOOR JAMBS AND OTHER OPENINGS. EXTEND REINFORCING AT JAMBS AND OPENINGS A MINIMUM OF 3'-0" PAST TOP OF OPENING.
25. PROVIDE CONTROL JOINTS IN CMU WALLS AS SHOWN ON SHEET S100.
26. LAP ALL REINFORCING BARS AS FOLLOWS:

LAP LENGTH FOR 8" CMU WITH REINFORCEMENT CENTERED			
BAR SIZE	f'm		
	2000 PSI	2500 PSI	3000 PSI
4	13"	12"	12"
5	20"	18"	16"
6	38"	34"	31"
7	52"	47"	42"
8	79"	71"	65"
9	103"	92"	84"

LAP LENGTH FOR 12" CMU WITH REINFORCEMENT CENTERED			
BAR SIZE	f'm		
	2000 PSI	2500 PSI	3000 PSI
4	12"	12"	12"
5	13"	12"	12"
6	24"	21"	20"
7	33"	29"	27"
8	50"	45"	41"
9	64"	57"	52"

STEEL DECK

1. STEEL DECK SHALL CONFORM TO THE MOST RECENT EDITION "SPECIFICATION FOR DESIGN OF LIGHT GAGE COLD-FORMED STRUCTURAL MEMBERS (AISI)", "SPECIFICATION FOR STRUCTURAL STEEL FOR BUILDINGS (AISC 360)", "STRUCTURAL WELDING CODE - STEEL (AWS D1.1)", AND "STRUCTURAL WELDING CODE - SHEET STEEL (AWS D1.3)".
2. STEEL DECK CROSS SECTIONS ARE ONLY REPRESENTED DIAGRAMMATICALLY ON THE DRAWINGS.
3. ROOF DECK SHALL CONFORM TO ASTM A653, Fy = 33 KSI MINIMUM, AND SHALL BE GALVANIZED CONFORMING TO ASTM A924 WITH A G60 COATING.
4. SUBMIT SIGNED AND SEALED SHOP DRAWINGS INDICATING LOCATION, GAGE AND SIZE OF EACH PIECE OF DECKING. CLEARLY SHOW ATTACHMENT DETAILS TO STRUCTURAL FRAMING, SIDE LAP CONNECTION DETAILS, LOCATION OF SHORING AND SUPPLEMENTARY SUPPORT STEEL AS REQUIRED.
5. WELD DECKING TO STRUCTURAL STEEL BY CERTIFIED WELDERS USING PREQUALIFIED PROCEDURES. THE ERECTOR SHALL ESTABLISH A WELDING PROCEDURE FOR THE PUDDLE WELD OF STEEL DECKING TO THE STRUCTURAL STEEL FOR THE PARTICULAR GAGES USED. PRIOR TO THE START OF ERECTION OF THE STEEL DECK, QUALIFY EACH WELDER USING THIS PROCEDURE AS WITNESSED BY THE OWNER'S TESTING LABORATORY.
6. PROVIDE SHEET METAL CLOSURES AT ALL OPENINGS AND EDGES AND CONTINUOUS DECK CLOSURES AT ALL DECK ENDS. PROVIDE COLUMN CLOSURES, RIDGE AND VALLEY PLATES, CANT STRIPS, RECESSED DRAIN SUMP PANS, ETC. PROVIDE SUPPLEMENTAL FRAMING AT OPENINGS AS REQUIRED FOR SUPPORT OF STEEL DECK.
7. PLACE STEEL DECK OVER A MINIMUM OF THREE (3) SPANS IN THE DIRECTION INDICATED; USE SINGLE SPANS ONLY WHERE REQUIRED BY FRAMING GEOMETRY.
8. THE ASSUMED CONSTRUCTION LIVE LOAD USED IN ROOF DECK IS 30 PSF UNIFORM, 200-POUND CONCENTRATED. DO NOT EXCEED THE ASSUMED CONSTRUCTION DESIGN LIVE LOAD WITHOUT FIRST TAKING PROPER SAFETY PRECAUTIONS, INCLUDING TEMPORARY SHORING. FOLLOW ALL APPLICABLE LOCAL AND AISI REQUIREMENTS.
9. DECK IS NOT DESIGNED FOR ANY HANGING LOADS. HANG ALL DUCTWORK, PIPING, ETC. DIRECTLY FROM STRUCTURAL STEEL WORK OR SUPPLEMENTAL MEMBERS. CONSULT EOR IF HANGING OF LOADS IS DESIRED.
10. ALL ROOF OPENINGS LARGER THAN 12" X 12" SHALL BE FRAMED ON FOUR SIDES. REFER TO DETAILS.

STEEL JOISTS

1. STEEL JOISTS SHALL COMPLY WITH THE STEEL JOIST INSTITUTE "STANDARD SPECIFICATIONS, LOAD TABLES & WEIGHT TABLES FOR STEEL JOISTS AND GIRDERS".
2. SUBMIT ENGINEERED AND CHECKED SHOP DRAWINGS TO THE ARCHITECT/ENGINEER FOR REVIEW SIGNED AND SEALED BY A PROFESSIONAL ENGINEER IN THE STATE OF MICHIGAN. SCHEDULE SUBMISSIONS TO ALLOW 10 WORKING DAYS FOR ENGINEER'S REVIEW PRIOR TO FABRICATION.
3. JOIST SUPPLIER SHALL PROVIDE JOISTS, JOIST GIRDERS AND BRIDGING THAT HAVE BEEN DESIGNED FOR THE LOADS SPECIFIED IN THE DESIGN DATA SHEET, AS WELL AS ANY ADDITIONAL LOADS SHOWN ON THE FRAMING PLANS.
4. JOIST SUPPLIER SHALL DESIGN JOISTS, JOIST GIRDERS AND BRIDGING FOR THE WIND UPLIFT PRESSURES AS INDICATED IN THE COMPONENTS AND CLADDING WIND LOAD SCHEDULE.
5. LAYOUT FOR DIAGONALS OF JOIST AND JOIST GIRDERS SHOWN IN SECTIONS OR ELEVATIONS IS FOR SCHEMATIC REPRESENTATION PURPOSES ONLY. SUPPLIER IS RESPONSIBLE FOR LAYOUT OF JOIST AND JOIST GIRDER DIAGONALS.
6. BEARING POINTS OF EQUIPMENT SUPPORTED BY ROOF JOISTS SHALL BE LOCATED AT A JOIST PANEL POINT OR A JOIST DIAGONAL SHALL BE ADDED TO THE JOIST. ADDITIONAL REINFORCEMENT IS NOT REQUIRED IF THE SJI CODE OF STANDARD PRACTICE PART 2.4 PROVISIONS FOR MAXIMUM 100 LB LOADS ARE SATISFIED.
7. JOISTS SHALL BE DESIGNED WITH A MINIMUM JOIST SEAT ROLLOVER CAPACITY OF 2 KIPS (SERVICE LEVEL).
8. JOIST SUPPLIER SHALL PROVIDE JOISTS WHICH ARE OF THE SAME DEPTH AND SPACING AS INDICATED ON THE PLANS.
9. ALL JOIST SEATS ALONG A GIVEN LINE SHALL HAVE THE SAME SEAT DEPTH REGARDLESS OF THE SERIES PROVIDED.
10. USE DOUBLE JOISTS WHERE REQUIRED TO MAINTAIN INDICATED MAXIMUM JOIST DEPTHS FOR SPECIAL JOISTS.
11. JOIST SUPPLIER SHALL COORDINATE WITH MECHANICAL DRAWINGS FOR THE LOCATIONS AND LOADS OF ALL ROOF-TOP UNITS.
12. JOIST SUPPLIER SHALL COORDINATE WITH MECHANICAL CONTRACTOR THE LOCATION OF THE BRIDGING IN THE AREAS OF MECHANICAL DUCT LAYOUT. IF BRIDGING HAS BEEN INSTALLED BY JOIST SUPPLIER, THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ANY REMOVED BRIDGING TO THE SATISFACTION OF THE JOIST SUPPLIER.

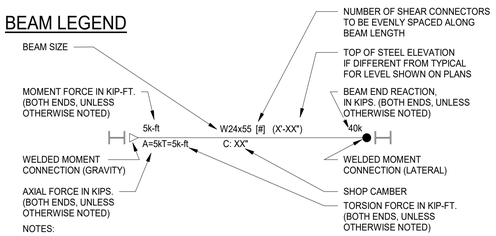
STRUCTURAL STEEL

1. STRUCTURAL STEEL WORK SHALL CONFORM TO THE AISC "SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL BUILDINGS", THE AISC CODE OF STANDARD PRACTICE AND SHALL COMPLY WITH ALL LOCAL LAWS AND ORDINANCES. WHERE CONFLICTING REQUIREMENTS OCCUR, THE MORE STRINGENT SHALL APPLY.
2. PROVIDE NEW MATERIAL CONFORMING TO THE FOLLOWING REQUIREMENTS FOR ALL STRUCTURAL STEEL:

MEMBER	GRADE
SHAPES	ASTM A992, GRADE 50
PLATES, ANGLES & CHANNELS	ASTM A36
PIPE TUBES	ASTM A53, GRADE B
RECTANGULAR TUBES	ASTM A500, GRADE C
ROUND TUBES	ASTM A500, GRADE C
HIGH STRENGTH BOLTS, NUTS & WASHERS	ASTM A325 (MIN. 3/4"Ø)
ANCHOR RODS	ASTM F1554, GRADE 36
WELDING ELECTRODE	E70XX
STEEL DECK WELDING ELECTRODE	E60XX MIN.

3. A QUALITY CONTROL PROGRAM OF SHOP AND FIELD TESTING AND INSPECTION SHALL BE PERFORMED ON STRUCTURAL STEEL FABRICATION, ERECTION, AND CONNECTIONS IN ACCORDANCE WITH THE SPECIFICATIONS. SCHEDULE WORK AND PROVIDE ACCESS TO ALLOW THE TESTING REQUIREMENTS TO BE COMPLETED.
4. PERFORM ALL WELDING USING CERTIFIED WELDERS AND IN ACCORDANCE WITH THE AWS D1.1 "STRUCTURAL WELDING CODE - STEEL", LATEST EDITION. COMPLY WITH AISC SPECIFICATION SECTION J2 FOR MINIMUM FILLET WELD SIZE, BUT DO NOT USE LESS THAN A 1/4 INCH FILLET UNLESS SPECIFICALLY NOTED ON THE DRAWINGS.
5. SUBMIT ENGINEERED AND CHECKED SHOP DRAWINGS TO THE ENGINEER FOR REVIEW. SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE LOCAL JURISDICTION. SHOW SHOP FABRICATION DETAILS, FIELD ASSEMBLY DETAILS, AND ERECTION DIAGRAMS FOR ALL STRUCTURAL STEEL. SCHEDULE SUBMISSIONS TO ALLOW 10 WORKING DAYS FOR ENGINEER'S REVIEW.
6. DESIGN AND DETAILING OF THE CONNECTIONS IS THE RESPONSIBILITY OF THE FABRICATOR. USE RATIONAL ENGINEERING DESIGN AND STANDARD PRACTICE FOR THE CRITERIA SET FORTH IN THE CONTRACT DOCUMENTS. THE DETAILS SHOWN ON THE DRAWINGS ARE CONCEPTUAL AND DO NOT INDICATE THE REQUIRED WELD SIZES OR NUMBER OF BOLTS UNLESS SPECIFICALLY NOTED.
7. SHOP CONNECTIONS TO BE 3/4" BOLTED OR WELDED. FIELD CONNECTIONS TO BE HIGH STRENGTH BOLTED OR WELDED. BOLTED CONNECTIONS ARE SHEAR/BEARING CONNECTIONS, AND SHALL BE INSTALLED TO THE SNUG TIGHT CONDITION UNLESS OTHERWISE INDICATED ON CONTRACT DRAWINGS (REFERENCE AISC SPECIFICATION FOR STRUCTURAL JOINTS USING GROUP A AND/OR B BOLTS).
8. DESIGN SINGLE-PLATE CONNECTIONS, IF SELECTED, USING A MINIMUM 3/8 INCH THICK PLATE. USE RATIONAL ENGINEERING DESIGN TO PROPERLY ACCOUNT FOR THE INHERENT RIGIDITY OF THIS CONNECTION TYPE.
9. FABRICATE ALL BEAMS, WITH THE NATURAL CAMBER UP. PROVIDE ANY ADDITIONAL CAMBER SHOWN ON THE STRUCTURAL DRAWINGS. CANTILEVER BEAMS SHALL BE FABRICATED SO THAT THE NATURAL CAMBER RAISES THE CANTILEVERED END.
10. DO NOT FIELD CUT ANY STRUCTURAL STEEL WITHOUT THE PRIOR REVIEW AND ACCEPTANCE OF THE ENGINEER. CLEARLY INDICATE ON THE SHOP DRAWINGS SUBMITTED FOR REVIEW ANY MEMBER OPENINGS REQUIRED BY OTHER TRADES.
11. ERECTION PROCEDURES, SEQUENCES AND COORDINATION OF WORK WITH OTHER TRADES IS THE RESPONSIBILITY OF THE CONTRACTOR. PROVIDE ANY ADDITIONAL STEEL REQUIRED FOR ERECTION PURPOSES AT NO COST TO THE OWNER. REMOVE THIS ADDITIONAL STEEL UNLESS DIRECTED OTHERWISE BY THE ENGINEER IN WRITING.
12. PROVIDE TEMPORARY BRACING AND SHORING AS REQUIRED FOR THE SAFETY, STABILITY AND ALIGNMENT OF THE STRUCTURE. LEAVE TEMPORARY BRACING IN PLACE FOR AS LONG AS NECESSARY. PERFORM FINAL BOLTING AND WELDING ONLY ON THOSE PORTIONS OF THE STRUCTURE THAT HAVE BEEN ALIGNED AND PLUMBED WITHIN THE SPECIFIED TOLERANCES.
13. AFTER FABRICATION, CLEAN STEEL OF ALL RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE OR OTHER FOREIGN MATERIALS.
14. STRUCTURAL STEEL CONTRACTOR SHALL VERIFY ALL FRAMED MECHANICAL, ELECTRICAL, & PLUMBING OPENINGS AS TO SIZE AND LOCATION WITH THE RESPECTIVE CONTRACTOR PRIOR TO SHOP DRAWINGS SUBMISSION. REFER TO PLANS & DETAILS FOR FRAMED OPENINGS IN FLOORS & DECKS.
15. STEEL ITEMS EMBEDDED IN CONCRETE AND MASONRY ARE TO BE PROVIDED BY STRUCTURAL STEEL CONTRACTOR AND INSTALLED BY GENERAL CONTRACTOR.
16. ALL STEEL THAT IS EXPOSED TO VIEW IN THE FINISHED WORK AT A MINIMUM SHALL BE AESS CATEGORY 2, UNLESS OTHERWISE NOTED ON IN THE CONTRACT DOCUMENTS & RECEIVE ONE COAT OF PRIMER AND TWO COATS OF FINISH PAINT.
17. REFER TO ARCHITECTURAL DRAWINGS FOR STEEL TO RECEIVE FIREPROOFING, AS REQUIRED. ALL STEEL THAT IS NOT TO BE FIREPROOFED OR ENCASED IN CONCRETE SHALL RECEIVE ONE SHOP COAT OF AN APPROVED RUST-INHIBITIVE PRIMER.
18. ALL EXTERIOR STEEL SHALL BE HOT-DIP GALVANIZED ASTM A123.
19. FOR ALL HUNG LINTELS AND SUPPORTS, PROVIDE VERTICAL AND HORIZONTAL ADJUSTMENTS. WELD COMPONENTS TOGETHER AFTER FINAL ADJUSTMENTS ARE MADE.
20. FABRICATION DETAIL DRAWINGS MAY NOT BE STARTED UNTIL SUBMITTALS FOR ANCHOR ROD LAYOUT AND ERECTION DRAWINGS OF ENTIRE STRUCTURE HAVE BEEN APPROVED BY THE ENGINEER.

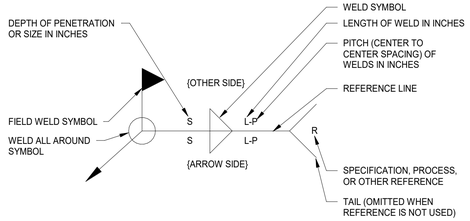
BEAM LEGEND



NOTES:

1. SHEAR REACTIONS, MOMENT REACTIONS, AXIAL FORCES, AND TORSION FORCES NOTED ON DRAWINGS REPRESENT THE CONTROLLING ASD COMBINATION.
2. PROVIDE FULL BEAM MOMENT CAPACITY IF MOMENT REACTION IS NOT NOTED ON DRAWINGS.
3. PROVIDE SHEAR REACTION CAPACITY EQUAL TO 50% UDL IF SHEAR REACTION IS NOT NOTED ON DRAWINGS.

WELD SYMBOL NOMENCLATURE



DRAWING SYMBOLS

VIEW TITLE: DETAIL NO. / TITLE / SCALE: X"=1'-0"	DETAIL CALLOUT: X / S000; DETAIL NO. / DRAWING NO.
SECTION MARKER: VIEWING DIRECTION; X / S000; DETAIL NO. / DRAWING NO.	ELEVATION MARKER: 1 / 2 / 3 / 4; S000; ELEVATION NO. / DRAWING NO.
1 KEYNOTE	BREAK MARKER
1 KEYNOTE (REMOVALS)	NORTH ARROW (SHOWN IN KEYPLAN)
SPAN DIRECTION SYMBOL	1 NEW COLUMN ID
REF. ELEV. ELEVATION NOTATION	1 EXISTING COLUMN ID
HI / LOW FOOTING STEP	HI / LOW WALL STEP
SLAB STEP	SLAB RAMP
BRACE FRAME	MOMENT FRAME

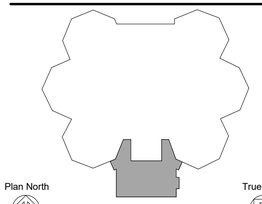
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D EBERT	K. TENNES
Designer	Reviewer
M. KUIPERS	K. TENNES
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

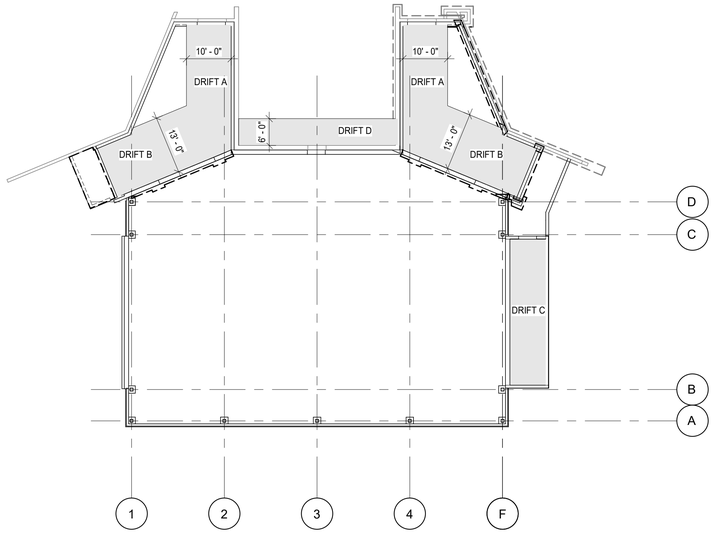
STRUCTURAL NOTES

Drawing Number

S002

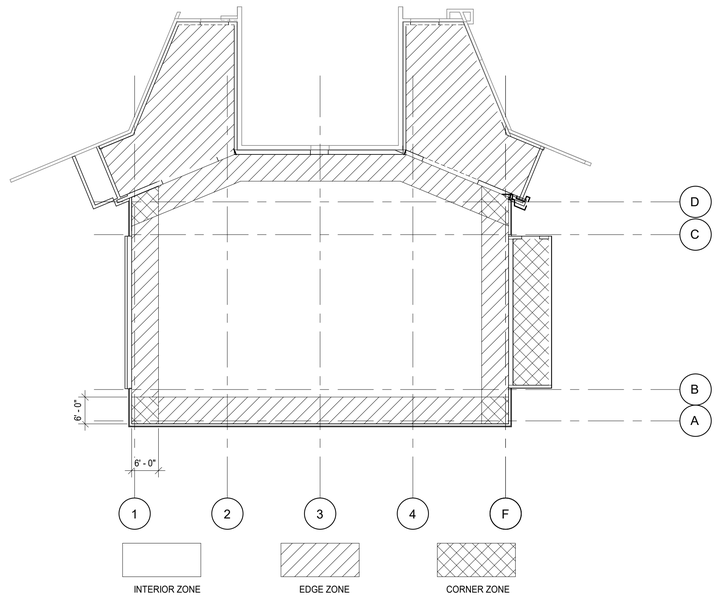
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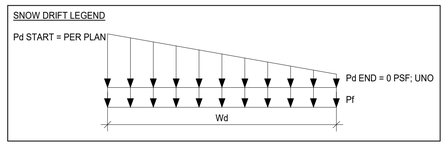
2 SNOW DRIFT PLAN

SCALE : 1/16" = 1'-0"



1 STRUCTURAL COMPONENTS AND CLADDING PLAN

SCALE : 1/16" = 1'-0"



DRIFT SCHEDULE

DRIFT A	Pd = 45 PSF	Wd = 10'
DRIFT B	Pd = 57 PSF	Wd = 13'
DRIFT C	Pd = 62 PSF (START) Pd = 17 PSF (END)	Wd = 10'
DRIFT D	Pd = 28 PSF	Wd = 6'

COMPONENT AND CLADDING WIND LOAD SCHEDULE

EFFECTIVE WIND AREA (SQ FT)	ROOF						WALL			
	INTERIOR (1)		EDGE (2)		CORNER (3)		INTERIOR (4)		EDGE (5)	
10	-32.5	13.2	-54.6	13.2	-82.2	13.2	-32.3	29.8	-39.7	29.8
20	-31.8	12.5	-49.1	12.5	-68.4	12.5	-31.0	28.5	-37.2	28.5
50	-30.5	11.2	-40.8	11.2	-49.1	11.2	-29.2	26.1	-33.5	26.1
100	-29.8	10.5	-35.3	10.5	-35.3	10.5	-27.3	25.4	-32.3	25.4
200	-29.8	10.5	-35.3	10.5	-35.3	10.5	-26.1	24.2	-27.3	24.2
500	-29.8	10.5	-35.3	10.5	-35.3	10.5	-24.8	22.3	-24.8	22.3

NOTES:

1. SEE ASCE 7-10 CHAPTER 30, PART 3, BUILDING WITH H<60 FT FOR DESIGN METHOD USED TO CALCULATE ULTIMATE COMPONENT AND CLADDING WIND LOADS. LOADS SHOWN IN TABLE ABOVE ARE ULTIMATE COMPONENT AND CLADDING WIND LOADS.
2. PER ASCE 7-10, CHAPTER 30, SECTION 30.2.2, THE MINIMUM ULTIMATE COMPONENT AND CLADDING DESIGN WIND PRESSURES SHALL NOT BE LESS THAN A NET PRESSURE OF 16.0 PSF ACTING IN EITHER DIRECTION NORMAL TO THE SURFACE.
3. POSITIVE PRESSURES ACT TOWARDS THE SURFACE. NEGATIVE PRESSURES ACT AWAY FROM THE SURFACE.
4. LINEARLY INTERPOLATE PRESSURES AND EFFECTIVE WIND AREAS BETWEEN THOSE SCHEDULED OR USE PRESSURES FOR THE SMALLER EFFECTIVE WIND AREA.

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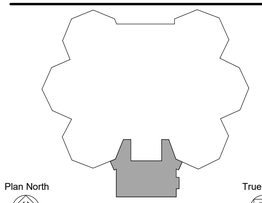
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Designer	Reviewer
M. KUIPERS	K. TENNES
Date Issued	Project Number
9/18/2023	23005898A

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LIVE LOAD & SNOW LOAD DIAGRAMS

Drawing Number

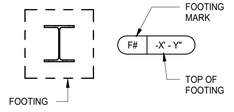
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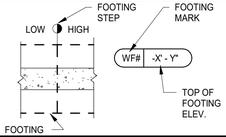
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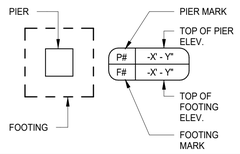
SYMBOL LEGEND

COLUMN FOOTINGS

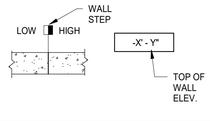


WALL FOOTINGS





WALLS



FOOTING SCHEDULE

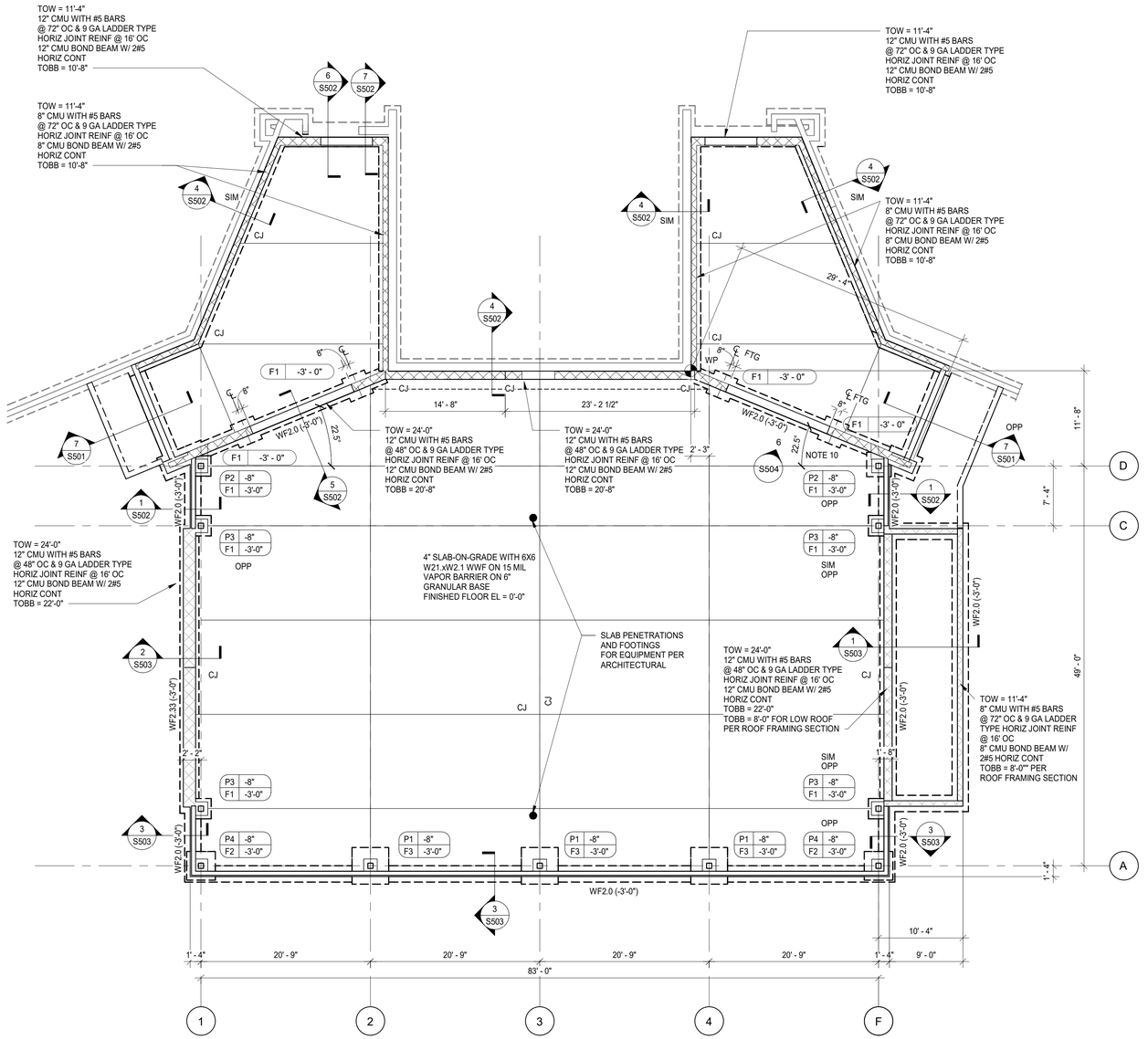
MARK	LENGTH	WIDTH	THICKNESS	REINFORCING
F1	3'-0"	3'-0"	1'-0"	(3) #5 EACH WAY, BOT.
F2	3'-6"	3'-6"	1'-0"	(4) #5 EACH WAY, BOT.
F3	4'-6"	4'-6"	1'-0"	(5) #5 EACH WAY, BOT.
WF1	CONT	2'-0"	1'-0"	(3) #5 CONT, #5@12" OC TRANS
WF2.33	CONT	2'-4"	1'-0"	(3) #5 CONT, #5@12" OC TRANS

PIER SCHEDULE

MARK	SIZE	VERT REINF	TIES	COMMENTS
P1	1'-8" X 1'-8"	8#5	#4 @ 12" OC W/4 IN TOP 10"	
P2	DET 2/S502	8#5	#4 @ 12" OC W/4 IN TOP 10"	
P3	DET 2/S502	8#5	#4 @ 12" OC W/4 IN TOP 10"	
P4	DET 2/S502	8#5	#4 @ 12" OC W/4 IN TOP 10"	

GENERAL NOTES

1. (+ OR -) ELEVATIONS ARE REFERENCED FROM 0'-0"
2. TOP OF SLAB ELEVATION IS 0'-0" UNLESS OTHERWISE NOTED.
3. TOP OF FOOTING ELEVATION IS -3'-0" UNLESS OTHERWISE NOTED.
4. TOP OF WALL ELEVATION IS 0'-0" UNLESS OTHERWISE NOTED.
5. TOP OF PIER ELEVATION IS -8" UNLESS OTHERWISE NOTED.
6. F1, P1 INDICATES FOOTING AND PIER DESIGNATIONS, RESPECTIVELY. REFER TO SCHEDULES.
7. SPREAD FOOTINGS AND PIERS ARE CENTERED ON COLUMN LINES UNLESS OTHERWISE NOTED.
8. WALLS ARE CENTERED ON FOOTINGS UNLESS OTHERWISES NOTED.
9. SLAB-ON-GROUND JOINTS ARE NOTED (IJ), (CJ), AND (EJ). REFER TO 6/S501. COORDINATE JOINTS WITH FINISHED FLOOR JOINTS.
10. WALL ANGLE TO MATCH EXISTING WALL PARALLEL TO NEW WALL.



1 FOUNDATION PLAN
SCALE : 1/8" = 1'-0"

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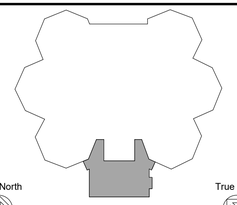
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Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

FOUNDATION PLAN

Drawing Number

S100

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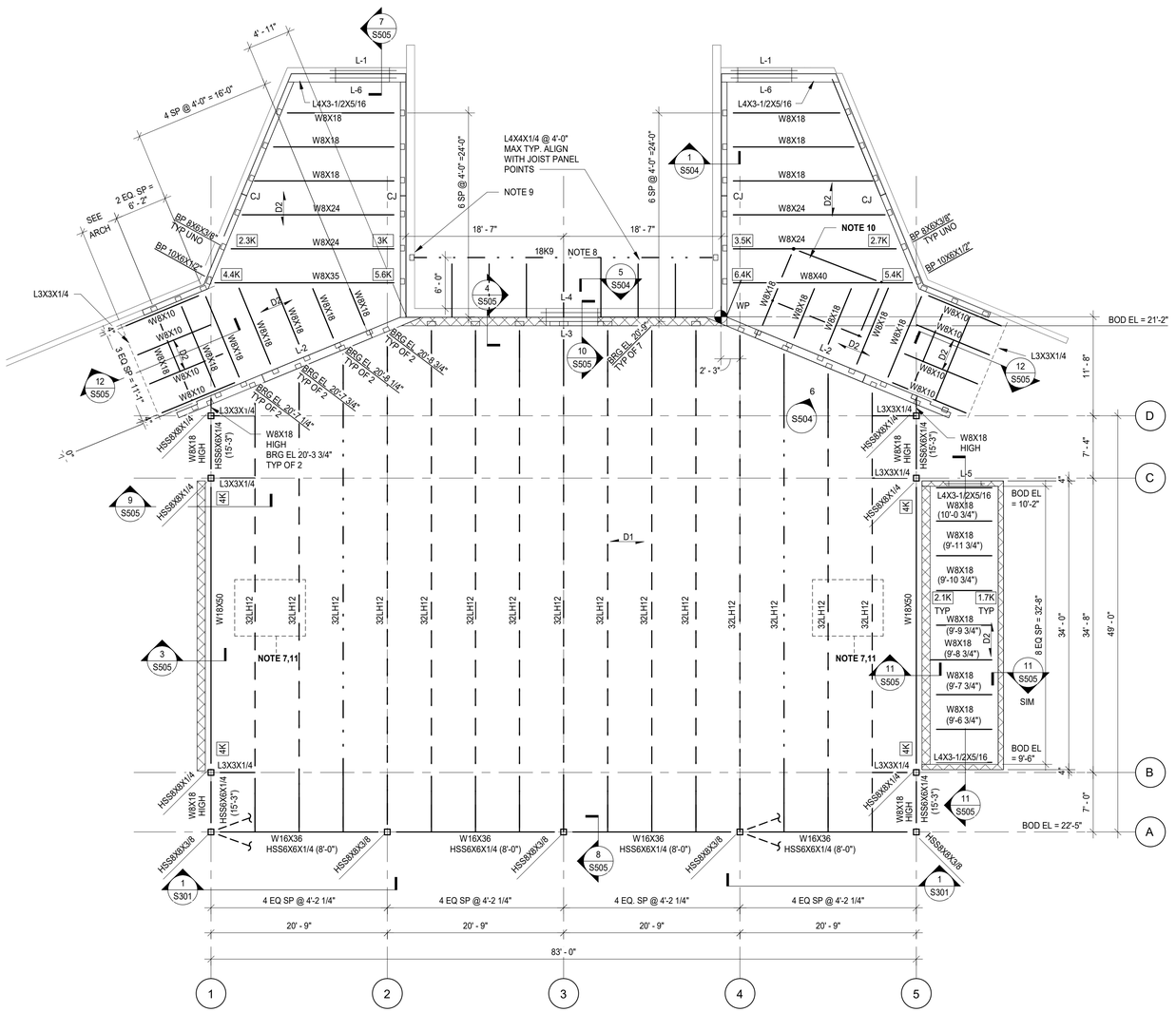
ARCH D 24x36

LINTEL SCHEDULE

MARK	SIZE	REMARKS
L-1	8"W x 16"D CMU LINTEL W/ 2-#5 BARS CONT AT 2" FROM BOTT.	PORTAL FRAME LINTEL UNDER 8"W x 8"D W/ 2-#5 CONT
L-2	W16x36 + PL 3/8x11 ON BOTT	
L-3	12"W x 24"D CMU LINTEL W/ 2-#5 BARS CONT AT 2" FROM BOTT.	PORTAL FRAME LINTEL UNDER 12"W x 8"D W/ 2-#5 CONT
L-4	W8x24 + PL 3/8x11 ON BOTT.	
L-5	8"W x 8"D CMU LINTEL W/ 2-#5 BARS CONT AT 2" FROM BOTT.	PORTAL FRAME LINTEL UNDER 12"W x 8"D W/ 2-#5 CONT
L-6	12"W x 16"D CMU LINTEL W/ 2-#5 BARS CONT AT 2" FROM BOTT.	PORTAL FRAME LINTEL UNDER 12"W x 8"D W/ 2-#5 CONT

GENERAL NOTES

1. (+ OR -) ELEVATIONS ARE REFERENCED FROM 0'-0"
2. TOP OF SLAB ELEVATION IS 0'-0" UNLESS OTHERWISE NOTED.
3. TOP OF STRUCTURAL STEEL ELEVATION IS 11'-4" UNLESS OTHERWISE NOTED.
4. D1 INDICATES SPAN DIRECTION OF 3" -22 GA DECK W/ 24/8 FASTENING TO SUPPORTS W/ 5/8" DIA PUDDLE WELDS AND #10 TEK SCREWS. SIDELAP FASTENERS AT 36" OC.
5. D2 INDICATES SPAN DIRECTION OF 1 1/2" -22 GA DECK W/ 36/4 FASTENING TO SUPPORTS W/ 5/8" DIA PUDDLE WELDS AND #10 TEK SCREWS. SIDELAP FASTENERS AT 36" OC.
6. BEAMS ARE EQUALLY SPACED BETWEEN COLUMN LINES UNLESS OTHERWISE NOTED.
7. JOIST MANUFACTURER TO ACCOUNT FOR EQUIPMENT LOADING. REFER TO APPROVED SHOP DRAWINGS.
8. DOUBLE PITCH JOIST, MATCH EXISTING SLOPE, MIDDLE SPLICE LOCATION DETERMINED BY JOIST MANUFACTURER.
9. POCKET JOIST BEARING INTO EXISTING CMU WALL, GROUT SOLID AT BEARING.
10. W8X10 BEAMS FOR RTU SUPPORT. COORDINATE LOCATIONS WITH MECHANICAL AND APPROVED SHOP DRAWINGS.
11. STEEL FABRICATOR TO PROVIDE MISC STEEL AS REQUIRED BY EQUIPMENT SHOPS.



1 ROOF FRAMING PLAN
SCALE : 1/8" = 1'-0"

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Plan North
True North
Key Plan

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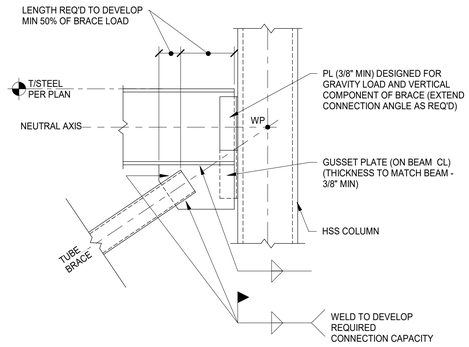
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ROOF FRAMING PLAN

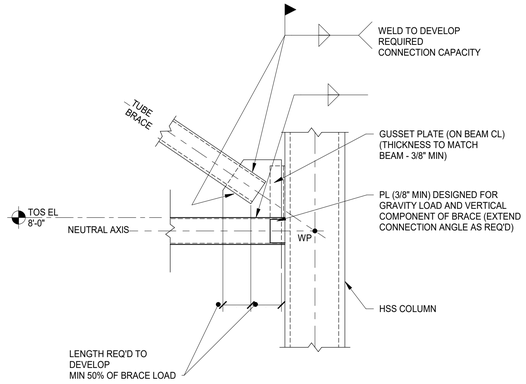
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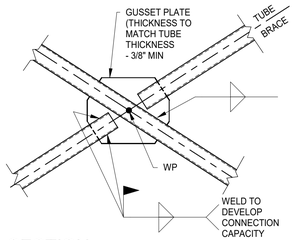
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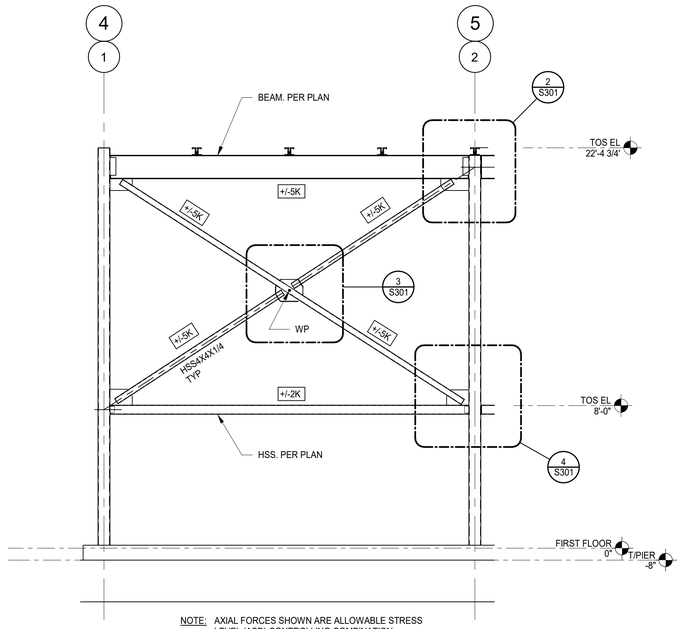
2 TYPICAL BRACE CONNECTION @ COLUMN DETAIL
SCALE : NO SCALE



4 TYPICAL BRACE CONNECTION @ COLUMN DETAIL
SCALE : NO SCALE



3 SECTION
SCALE : 3/4" = 1'-0"



NOTE: AXIAL FORCES SHOWN ARE ALLOWABLE STRESS LEVEL (ASD) CONTROLLING COMBINATION

1 BRACING ELEVATION
SCALE : 1/4" = 1'-0"

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Project Manager	Discipline Lead
D EBERT	K. TENNES
Designer	Reviewer
M. KUIPERS	K. TENNES
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

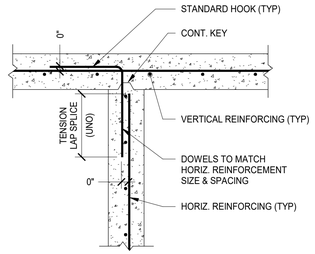
BRACING ELEVATIONS

Drawing Number

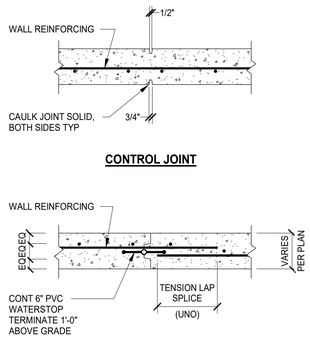
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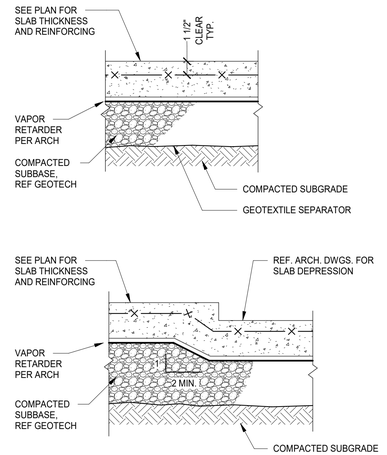
ARCH D 24x36



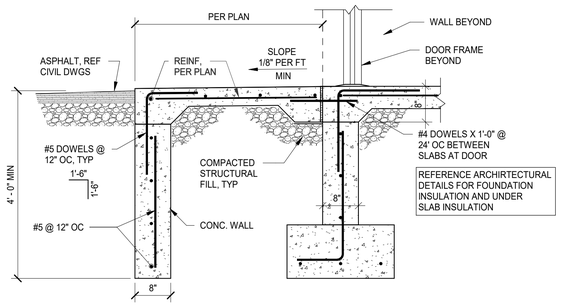
8 TYPICAL CONCRETE WALL INTERSECTION DETAIL
SCALE : 3/4" = 1'-0"



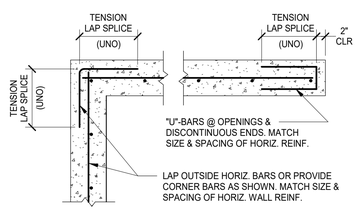
5 TYPICAL CONCRETE WALL JOINT DETAILS
SCALE : 3/4" = 1'-0"



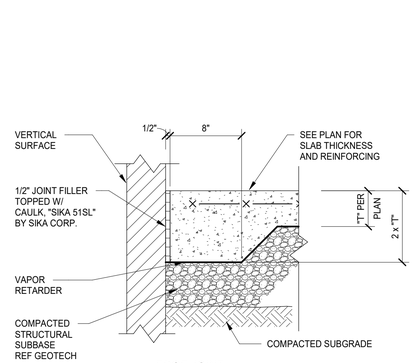
2 TYPICAL SLAB-ON-GRADE CONSTRUCTION
SCALE : 1 1/2" = 1'-0"



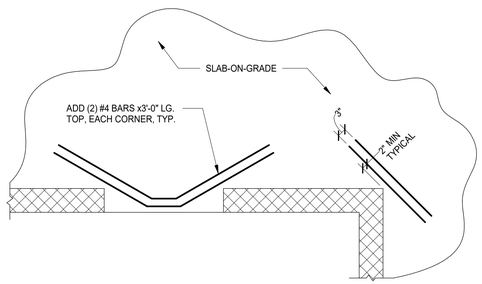
7 TYPICAL STOOP DETAIL
SCALE : 3/4" = 1'-0"



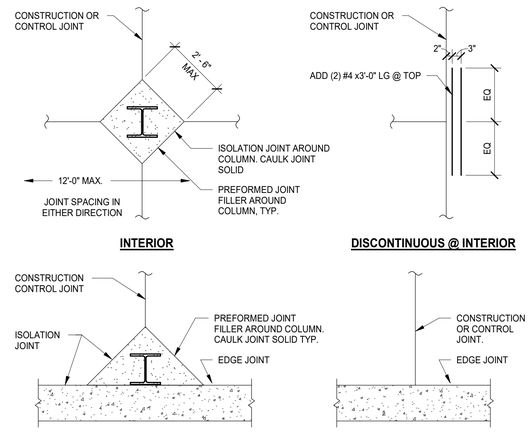
4 TYPICAL CONCRETE WALL CORNER & END DETAIL
SCALE : 3/4" = 1'-0"



1 TYPICAL SLAB-ON-GRADE JOINTS
SCALE : 1 1/2" = 1'-0"



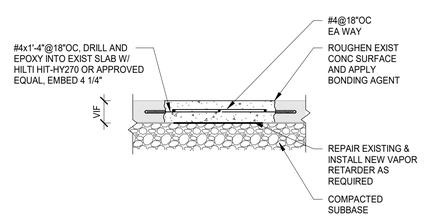
9 TYPICAL SLAB-ON-GRADE INTERIOR CORNER DETAIL
SCALE : 1/2" = 1'-0"



NOTES:

1. SEE PLAN FOR SLAB JOINT LOCATIONS.

6 TYPICAL SLAB-ON-GRADE JOINT DETAILS
SCALE : 1/2" = 1'-0"



3 TYPICAL INFILL SLAB ON GROUND DETAIL
SCALE : 3/4" = 1'-0"

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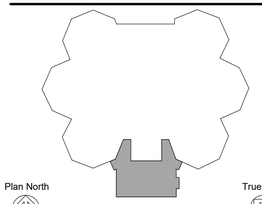
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
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M. KUIPERS	K. TENNES
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Sheet Name

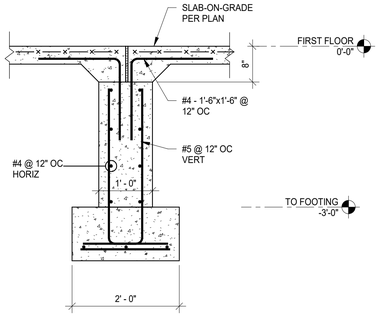
SECTIONS & DETAILS

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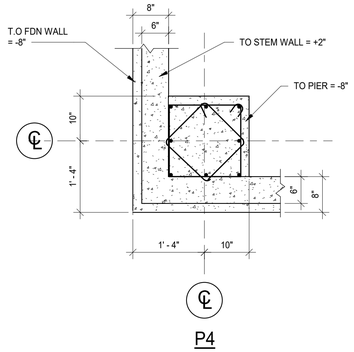
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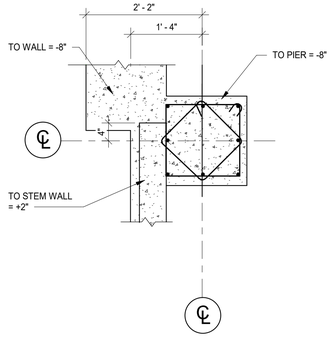
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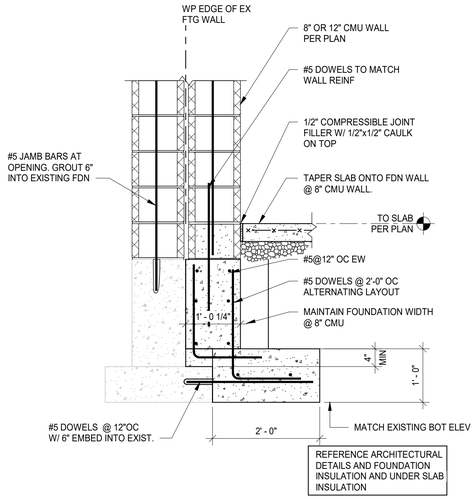
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SCALE : 3/4" = 1'-0"



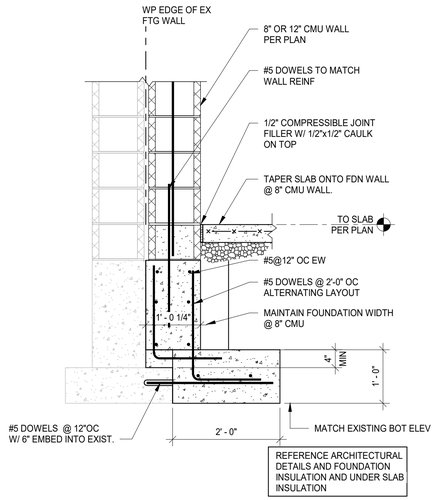
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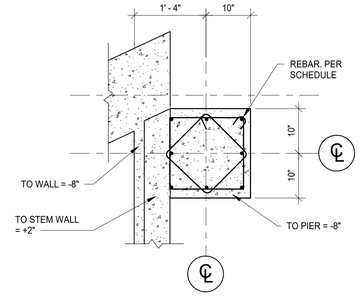
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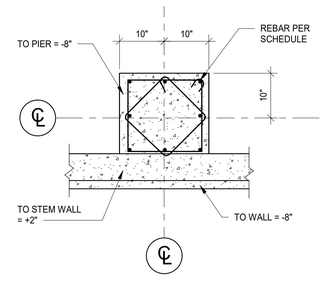
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SCALE : 3/4" = 1'-0"



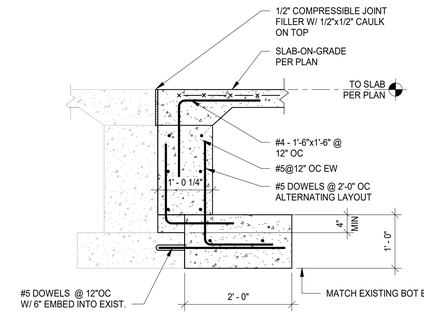
4 SECTION
SCALE : 3/4" = 1'-0"



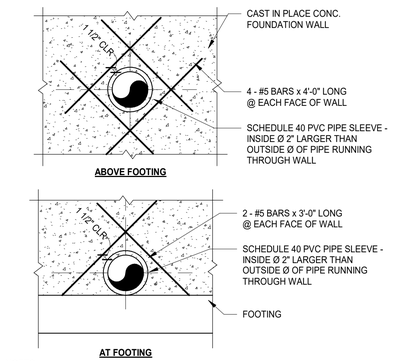
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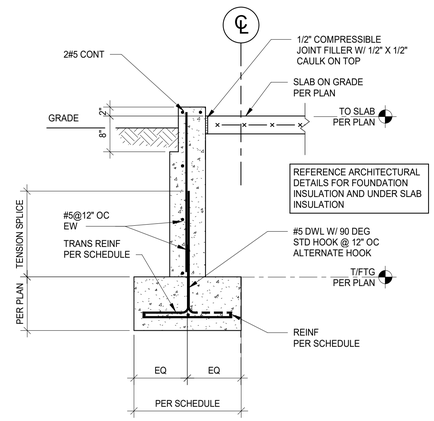
6 SECTION
SCALE : 3/4" = 1'-0"



NOTES:

1. PROVIDE 6" MINIMUM CLEAR COVER BETWEEN ADJACENT OPENINGS.

3 TYPICAL WALL REINFORCING FOR PIPE OPENING
SCALE : 3/4" = 1'-0"



1 SECTION
SCALE : 3/4" = 1'-0"

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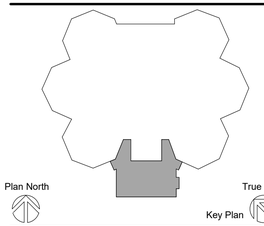
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ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
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Project Manager	Discipline Lead
D EBERT	K. TENNES
Designer	Reviewer
M. KUIPERS	K. TENNES
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

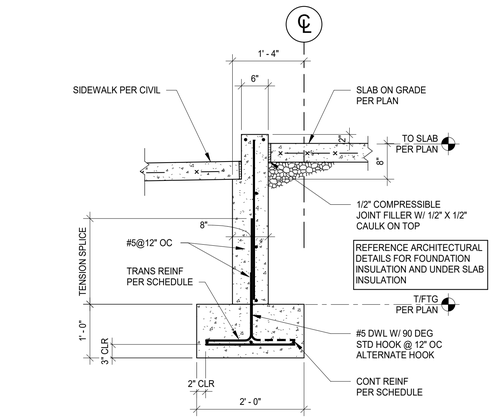
SECTION & DETAILS

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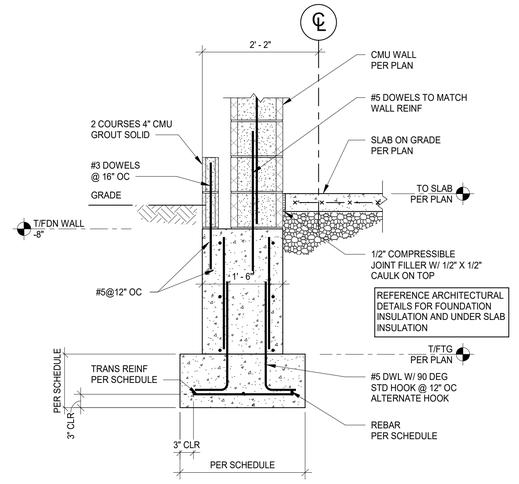
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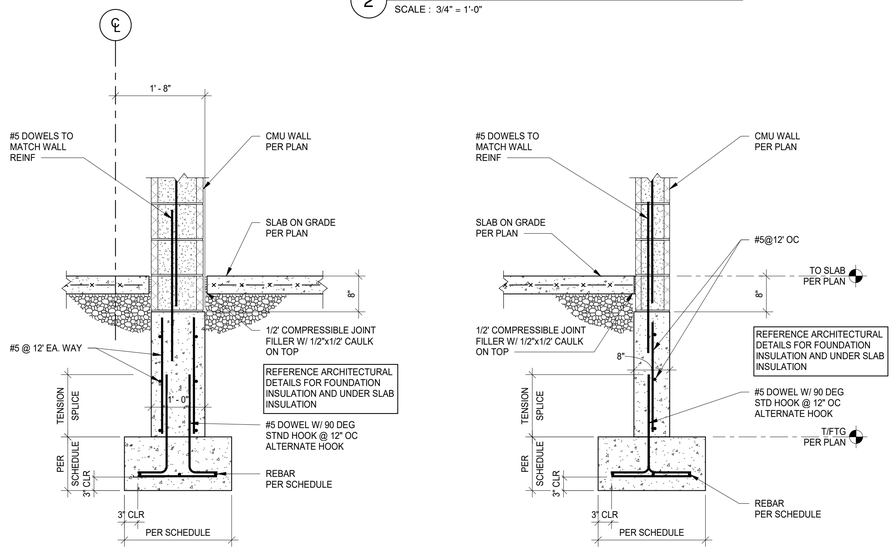
ARCH D 24x36



3 SECTION
SCALE : 3/4" = 1'-0"



2 SECTION
SCALE : 3/4" = 1'-0"



1 SECTION
SCALE : 3/4" = 1'-0"

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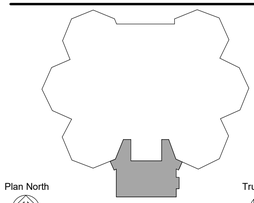
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Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

SECTIONS & DETAILS

Drawing Number

S503

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REINFORCING LAP SCHEDULE

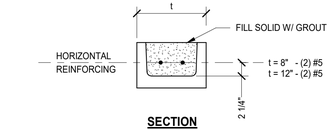
BAR SIZE	CONCRETE LAP SPLICE (CLASS B) (IN)									
	f'c = 3,000 psi		f'c = 3,500 psi		f'c = 4,000 psi		f'c = 4,500 psi		f'c = 5,000 psi	
	TOP	OTHER	TOP	OTHER	TOP	OTHER	TOP	OTHER	TOP	OTHER
3	17	16	16	16	16	16	16	16	16	16
4	23	18	21	16	20	16	19	16	18	16
5	28	22	26	20	25	19	23	18	22	17
6	34	26	31	24	29	23	28	21	26	20
7	49	38	45	35	43	33	40	31	38	29
8	56	43	52	40	49	37	46	35	44	34

ASSUMPTIONS:

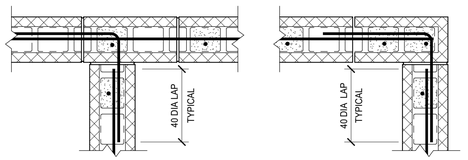
1. NORMAL WEIGHT CONCRETE.
2. STEEL REINFORCEMENT fy = 60,000psi
3. UNCOATED STEEL REINFORCEMENT.
4. CLEAR COVER TO REINFORCEMENT IS 2 INCHES.
5. NO TRANSVERSE REINFORCEMENT.

MODIFICATIONS:

1. LIGHTWEIGHT CONCRETE MULTIPLY VALUE BY 1.33
2. EPOXY COATED MULTIPLY VALUE BY 1.5
3. CLEAR COVER 1 1/2 INCHES:
   No. 6 BAR & SMALLER MULTIPLY VALUE BY 1.0
   No. 7 BAR MULTIPLY VALUE BY 1.13
   No. 8 BAR & LARGE MULTIPLY VALUE BY 1.25



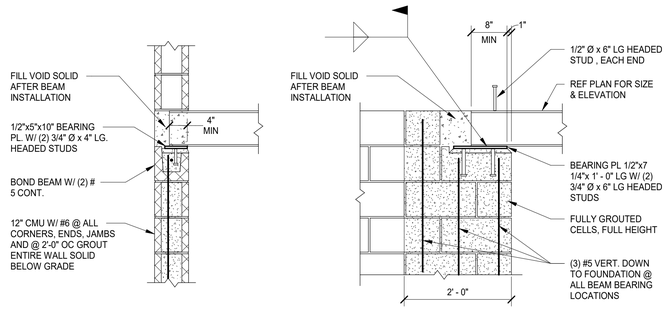
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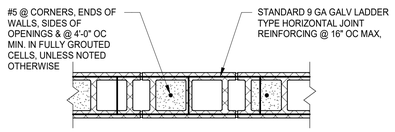
INTERSECTION CORNERS

PLAN

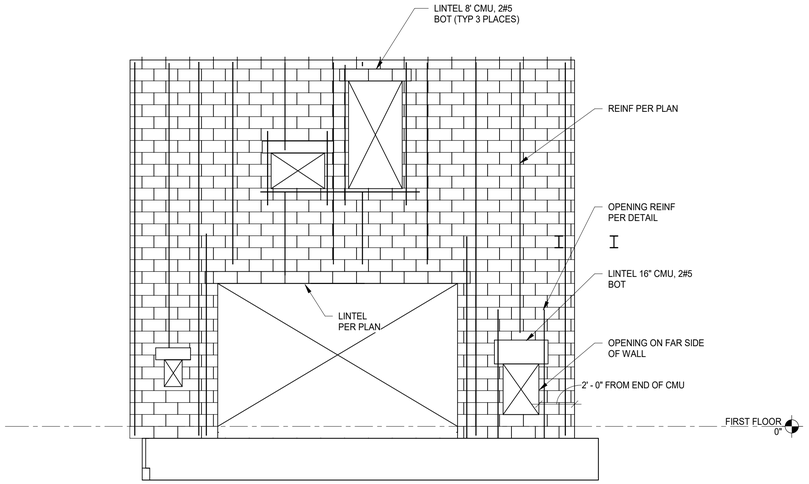
4 TYPICAL STRUCTURAL BOND BEAM IN CMU WALLS
SCALE : 1" = 1'-0"



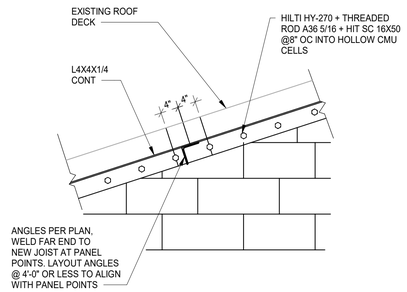
3 TYPICAL LINTEL BEARING DETAIL
SCALE : 3/4" = 1'-0"



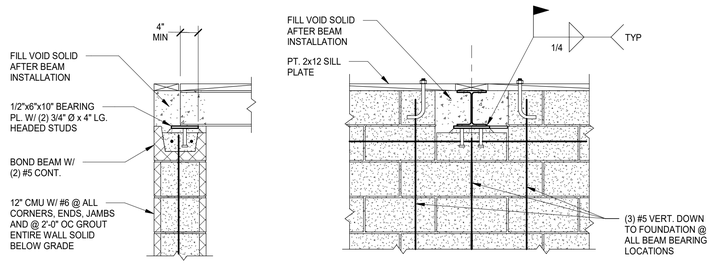
2 TYPICAL CMU WALL REINFORCING
SCALE : 1" = 1'-0"



6 ELEVATION
SCALE : 1/4" = 1'-0"



5 SECTION
SCALE : 3/4" = 1'-0"



1 TYPICAL BEAM BEARING DETAIL
SCALE : 3/4" = 1'-0"

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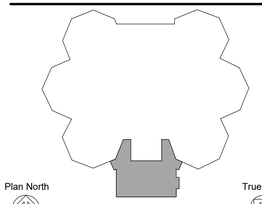
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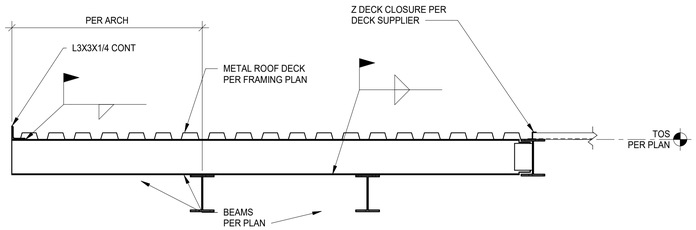
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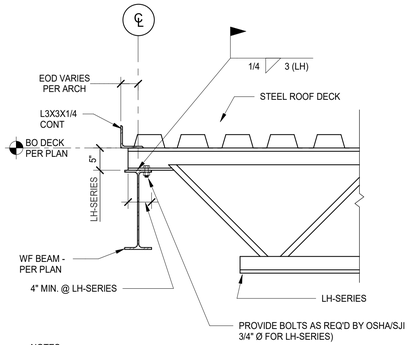
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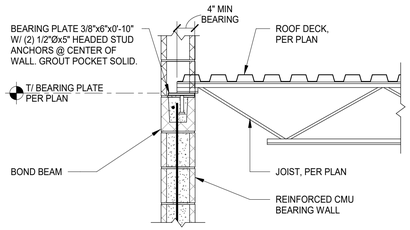
12 SECTION
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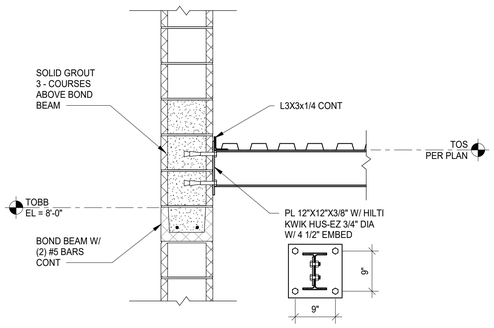
NOTES:

1. REFER TO ROOF FRAMING PLAN FOR BEAM AND JOIST SIZE AND LOCATION

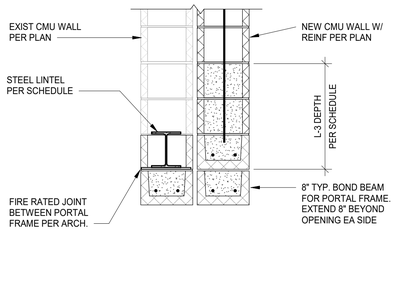
8 TYPICAL JOIST BEARING ON STEEL BEAM
SCALE : 3/4" = 1'-0"



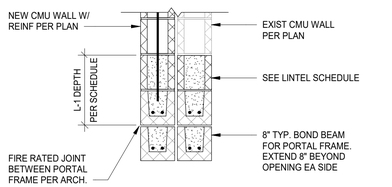
4 TYPICAL JOIST BEARING @ CMU
SCALE : 3/4" = 1'-0"



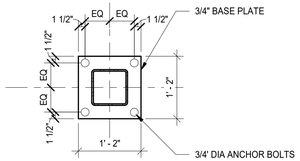
11 SECTION
SCALE : 3/4" = 1'-0"



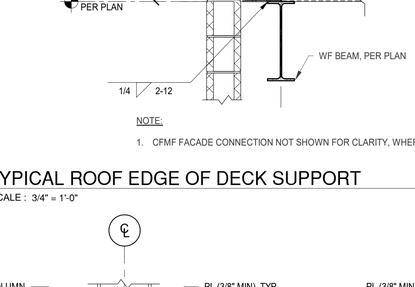
10 SECTION
SCALE : 3/4" = 1'-0"



7 SECTION
SCALE : 3/4" = 1'-0"



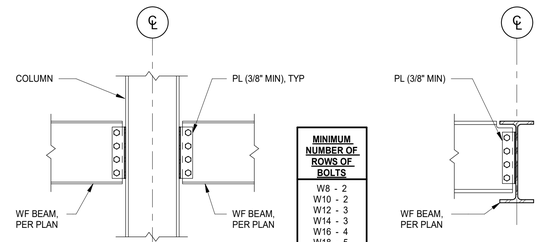
6 TYPICAL COLUMN BASE PLAN - TYPE A
SCALE : NO SCALE



NOTE:

1. CFMF FACADE CONNECTION NOT SHOWN FOR CLARITY, WHERE APPLICABLE

3 TYPICAL ROOF EDGE OF DECK SUPPORT
SCALE : 3/4" = 1'-0"

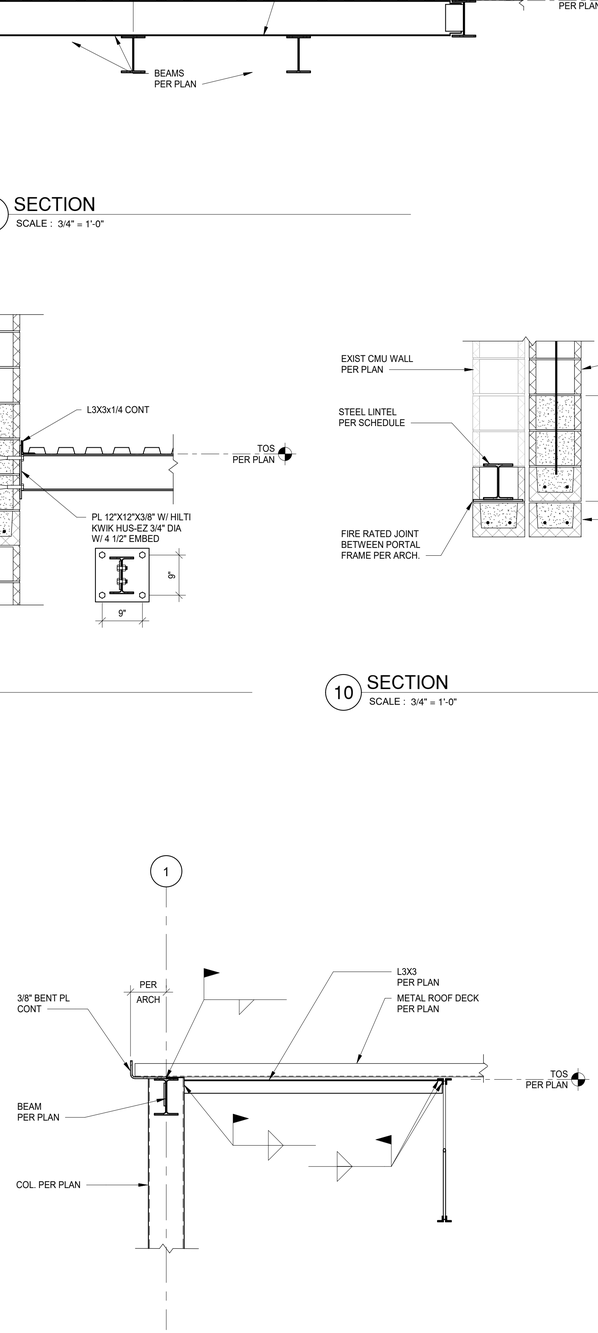


MINIMUM NUMBER OF ROWS OF BOLTS
W8 - 2
W10 - 2
W12 - 3
W14 - 3
W16 - 4
W18 - 5
W21 - 6
W24 - 7
W27 - 7
W30 - 8

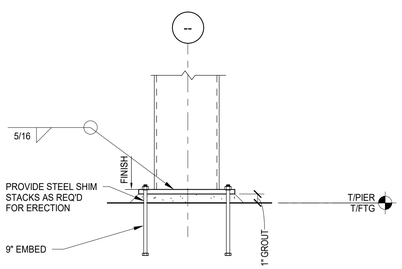
NOTES:

1. AT ALL BEAM CONNECTIONS, PROVIDE NUMBER OF 3/4" Ø A325 BOLTS REQUIRED TO SATISFY REACTIONS SHOWN ON FRAMING PLANS, BUT IN NO CASE LESS THAN THE MINIMUM NUMBER OF ROWS OF BOLTS FOR THE BEAM DEPTH AS INDICATED IN THE TABLE.

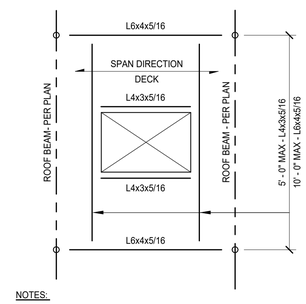
2 TYPICAL BEAM CONNECTIONS
SCALE : 3/4" = 1'-0"



9 SECTION
SCALE : 3/4" = 1'-0"



5 TYP COLUMN BASE DETAIL
SCALE : NO SCALE



NOTES:

1. ALL UNEQUAL LEG ANGLES ARE TO BE LONG LEG VERTICAL (LLV)

1 TYPICAL REINFORCING @ OPENING IN ROOF DECK
SCALE : 1/2" = 1'-0"

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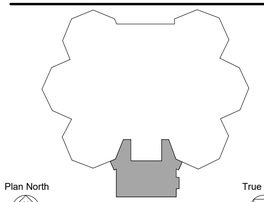
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

SECTIONS & DETAILS

Drawing Number

S505

9/20/2023 4:22:19 PM

ARCH D 24x36

DRAWING SYMBOLS

VIEW TITLE DETAIL NO. 1 View Name SCALE : 1/8" = 1'-0"	DETAIL CALLOUT DETAIL NO. SIM 1 A101 DRAWING NO.	101	DOOR MARKER
		XX	WINDOW TYPE MARKER
		Room name 101	ROOM TAG
SECTION MARKER VIEWING DIRECTION DETAIL NO. 1 A101 DRAWING NO.	ELEVATION MARKER Ref 1 ELEVATION NO. 1 A000 DRAWING NO. Ref 1 1 A101 Ref 1 Ref Ref 1		SCHEDULED DOOR
			EXISTING DOOR
		#	KEYNOTE
DETAIL SECTION VIEWING DIRECTION DETAIL NO. 1 A101 DRAWING NO.	BREAK MARKER	#	KEYNOTE (REMOVALS)
	NORTH ARROW (SHOWN IN KEYPLAN) N	XX	EQUIPMENT TAG
	XXX NEW COLUMN ID		ELEVATION NOTATION
1 ACCESSORY MARKER	XXX EXISTING COLUMN ID	8' - 0"	CEILING HEIGHT

MATERIAL INDICATORS

	UNDISTURBED EARTH		STEEL		FINISH WOOD
	GRAVEL OR CRUSHED STONE		RIGID INSULATION		BATT INSULATION
	CAST STONE		BRICK		WOOD FRAMING (CONTINUOUS)
	CONCRETE		PLYWOOD		WOOD BLOCKING (DISCONTIN.)
	CONCRETE MASONRY UNIT		SAND OR GYPSUM BOARD		EXISTING

WALL STYLES

	EXISTING BRICK WALL		BRICK WALL		EXISTING WALL REMOVAL
	EXISTING CMU WALL		CMU WALL		
	EXISTING STUD WALL		STUD WALL		

ABBREVIATIONS

A/C	AIR CONDITIONING
ACP	ACOUSTICAL CEILING PANELS
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
ALUM	ALUMINUM
BD	BOARD
BLKG	BLOCKING
BO	BOTTOM OF
CG	CORNER GUARD
CJ	CONTROL JOINT
CL	CENTER LINE
CLG	CEILING
CLR	CLEAR
CM	CONSTRUCTION MANAGER
CMT	CERAMIC MOSAIC TILE
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CT	CERAMIC TILE
CTB	CERAMIC TILE BASE
D	DEEP
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DWG	DRAWING
EA	EACH
EIFS	EXTERIOR INSULATION FINISH SYSTEM
ELEC	ELECTRICAL
ELEV	ELEVATIONS
EXF	EPOXY FLOORING
EXP	EXPANSION
EXP BT	EXPANSION BOLT
EXT	EXTERIOR
F	FABRIC
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FFE	FINISH FLOOR ELEVATION
FLG	FLOORING
FLR	FLOOR
FPR	FIBER REINFORCED PLASTIC
FR	FIRE RATED
FT	FLOOR TILE
FTG	FOOTING
GA	GAUGE
GALV	GLAVANIZED
GC	GENERAL CONTRACTOR
H	HIGH
HB	HOSE BIBB
HC	HOLLOW CORE
HDR	HEADER
HDWR	HARDWARE
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HPC	HIGH PERFORMANCE COATING
HVAC	HEATING/VENTILATION/AIR CONDITIONING
HW	HOT WATER
HWT	HOT WATER TANK

ID	INTERIOR DIAMETER
INSUL	INSULATION
INT	INTERIOR
INV	INVERT
JAN CL	JANITORS CLOSET
JT	JOINT
L	LONG
LAM	LAMINATE
LAV	LAVATORY
LLV	LONG LEG VERTICAL
LMC	LINEAR METAL CEILING
LTL	LINTEL
LVR	LOUVER
LVT	LUXURY VINYL TILE
MAX	MAXIMUM
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MIN	MINIMUM
MO	MASONRY OPENING
MTL	METAL
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
OPP	OPPOSITE
P	PAINTED
PB	PORCELAIN BASE
PCC	PRE CAST CONCRETE
PCF	POUNDS PER CUBIC FOOT
PL	PLATE
PLF	POUNDS PER LINEAR FOOT
PLM	PLASTIC LAMINATE
PP	PLASTIC PANELING
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PORCELAIN TILE
PTWD	PRESSURE PRESERVATIVILY - TREATED WOOD
QT	QUARRY TILE
R	RISER
RB	RUBBER BASE
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REBAR	REINFORCED STEEL BARS
REINF	REINFORCING
RESIL	RESILIENT
RF	RESILIENT FLOORING
RM	ROOM
RO	ROUGH OPENING
RTU	ROOF TOP UNIT
SC	SEALED CONCRETE
SIM	SIMILAR
SMS	SHEET METAL SCREW
SPEC	SPECIFICATION
SS	SOLID SURFACE
SST	STAINLESS STEEL
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURAL
SYS	SYSTEM

T	TREAD
T&G	TONGUE AND GROOVE
TEMP	TEMPORARY
TH	THRESHOLD
TO	TOP OF
TO	
TR	TRANSITION
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UPH	UPHOLSTERY
UR	URINAL
VAR	VARIES
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
VIF	VERIFY IN FIELD
VWC	VINYL WALL COVERING
W	WIDE
W/	WITH
W/O	WITHOUT
WB	WOOD BASE
WC	WATER CLOSET
WCV	WALL COVERING
WD	WOOD
WDT	WINDOW TREATMENT
WF	WOOD FLOORING
WOM	WALKOFF MAT
WP	WATERPROOF
WT	WALL TILE

GENERAL NOTES:

ENERGY CODE STATEMENT:
TO THE BEST OF THE REGISTERED DESIGN PROFESSIONAL'S KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT, THESE PLANS AND/OR SPECIFICATIONS ARE IN COMPLIANCE WITH THE APPLICABLE CODES.

ALL GENERAL NOTES PERTAIN TO ALL ARCHITECTURAL (A-SERIES) DRAWINGS IN THIS SET

GENERAL

1. DEFINITIONS: "PROVIDE" MEANS FURNISH AND INSTALL. SUPPLY LABOR AND MATERIALS TO RESULT IN A FINISHED AND/OR OPERABLE SYSTEM.
2. CONTRACTOR RESPONSIBILITIES:
   A. MATERIALS, CONSTRUCTION METHODS INCLUDING BUT NOT LIMITED TO LAYOUT, COORDINATION, SCHEDULE AND CONSTRUCTION SITE ACCESS AND WORK.
   B. DAILY CLEANING: KEEP SITE FREE FROM WASTE, RUBBISH, AND DEBRIS, ALL OF WHICH SHALL BE REMOVED AND DISPOSED OF PROPERLY DAILY.
   C. FINAL CLEANING: PRIOR TO PUNCHLIST INSPECTION, BROOM CLEAN ALL HARD SURFACE FLOORS; VACUUM ALL CARPETING; AND WIPE DOWN ALL HORIZONTAL AND GLASS SURFACES, THEREBY PROVIDING DUST FREE SURFACES.
   D. TEMPORARY PROTECTION IS REQUIRED TO MAINTAIN ONGOING BUILDING OPERATIONS, EXITING PATHS, DUST CONTROL AND OCCUPANT SAFETY. IDENTIFY THE REQUIREMENTS FOR TEMPORARY PROTECTION AND PROJECT PHASING. COORDINATE WITH OWNER FOR OTHER REQUIREMENTS.
   E. COORDINATE STARTUP AND ADJUSTING OF EQUIPMENT AND OPERATING COMPONENTS. START EQUIPMENT AND OPERATING COMPONENTS AND TEST TO CONFIRM PROPER OPERATION AND CONTROL. REMOVE MALFUNCTIONING UNITS, REPLACE WITH NEW UNITS, AND RETEST.
   F. CLOSEOUT DOCUMENTS, CERTIFICATE OF RELEASE FROM THE AUTHORITY OF JURISDICTION AND INSURANCE FOR CONTINUING COVERAGE, WARRANTIES, TEST & INSPECTION RESULTS AND OPERATION, EMERGENCY & MAINTENANCE MANUALS.
3. CONTRACT DOCUMENTS:
   A. PLANS, ELEVATIONS, SECTIONS, DETAILS AND SCHEDULES ARE COMPLEMENTARY. PLAN DRAWINGS WILL TAKE PRECEDENCE OVER ELEVATION, SECTION AND DETAILS DRAWINGS IN ANY CONFLICTS OF HORIZONTAL DIMENSIONS. DETAIL PLAN DRAWINGS WILL TAKE PRECEDENCE OVER LARGER SCALE PLANS IN ANY CONFLICTS WITH HORIZONTAL DIMENSIONS. WALL AND BUILDING SECTIONS WILL TAKE PRECEDENCE OVER PLAN DRAWING AND DETAILS IN ANY CONFLICTS WITH VERTICAL DIMENSIONS. DETAILS AND WALL SECTIONS WILL TAKE PRECEDENCE OVER ELEVATION AND PLAN DRAWINGS IN ANY CONFLICTS WITH MATERIAL DESCRIPTION. SCHEDULES WILL TAKE PRECEDENCE OVER OTHER ARCHITECTURAL DRAWINGS IN AND CONFLICTS WITH WALL, FLOOR AND CEILING FINISHES AND DOOR, DOOR HARDWARE AND FENESTRATION INFORMATION.
   B. DRAWINGS AND SPECIFICATIONS PREPARED BY THE ARCHITECT ARE INSTRUMENTS OF THE ARCHITECT'S SERVICE FOR USE SOLELY WITH RESPECT TO THIS PROJECT AND, UNLESS OTHERWISE PROVIDED, BERGMANN SHALL BE DEEMED THE AUTHOR OF THESE DOCUMENTS AND RETAIN ALL COMMON LAW, STATUTORY AND OTHER RESERVED RIGHTS, INCLUDING THE COPYRIGHT.
   C. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDUM.

FINISHES

1. GENERAL: FINISHED FLOORS EXTEND INTO TOE SPACES, CLOSETS, DOOR REVEALS AND SIMILAR OPENINGS.
2. PRODUCTS:
   A. PAINT DESIGNATIONS INDICATE COLOR ONLY, REFER TO SPECIFICATION FOR FINISH TYPE.
   B. PROVIDE SELF LEVELING TROWELABLE UNDERLAYMENT WHERE REQUIRED TO OBTAIN FINISH MANUFACTURER'S REQUIRED SUBFLOOR CONDITION.
   C. PROVIDE THE REQUIRED TRANSITIONS BASED ON TYPES IDENTIFIED ON DRAWINGS AT EACH FINISH TRANSITION LOCATION.

WALLS

A. DIMENSIONS:
   a. STUD WALLS ARE TO FACE OF STUD, UNLESS OTHERWISE INDICATED IN A.c. OR A.d. BELOW.
   b. MASONRY WALLS ARE TO FACE OF MASONRY.
   c. EXISTING CONSTRUCTION ARE TO FINISHED FACE OF CONSTRUCTION.
   d. WHERE NOTED AS "CLR" DIMENSIONS ARE TO FINISHED SURFACE AND ARE CRITICAL FOR ACCESSIBILITY REQUIREMENTS OR BUILT-IN FURNISHINGS.

B. TYPES:
   a. WALLS NOT INDICATED WITH A WALL TYPE SHALL BE DESCRIBED IN WALL SECTION.
   b. BRACING: PROVIDE CHANNEL COLD ROLLED STEEL (CRSS) BRACING AT ALL METAL STUD WALLS. INSTALL TWO ROWS OF BRACING 4'-0" O.C. FOR WALLS UP TO 13'-0" HIGH.
   c. PROVIDE (2) #10-7/16" HEX HEAD SHEET METAL SCREWS AT EACH STUD/TRACK CONNECTION AT ALL WALLS, BULK HEADS & SOFFITS NOT EXTENDING FLOOR TO DECK.
   d. PROVIDE DEFLECTION TRACK OR CLIP AT TOP OF METAL STUD WALLS THAT EXTEND TO THE UNDERSIDE OF STRUCTURAL MEMBERS OR FLOOR/ ROOF DECK.
   e. METAL STUD WALLS IN WHICH STUDS DO NOT EXTEND TO DECK ABOVE SHALL BE LATERALLY BRACED AT 45 DEGREES TO THE STRUCTURE ABOVE WITH 3 5/8" x 20 GA. STUDS @ 48" O.C. MAX., AND AT ENDS OF SUCH WALLS WHICH DO NOT INTERSECT OTHER WALLS.
   f. PROVIDE FULL HEIGHT DOUBLE STUDS AT DOOR AND WINDOW JAMBS.
   g. FIRE-RESISTANT JOINT SYSTEMS: AT FIRE-RESISTANT RATED WALLS, FLOORS OR FLOOR/CEILING ASSEMBLIES, AND ROOFS OR ROOF/CEILING ASSEMBLIES, PROVIDE AN APPROVED TESTED JOINT ASSEMBLY PROVIDING THE MINIMUM TIME AND TEMPERATURE RISE AT THE WALL, FLOOR, OR ROOF SUITABLE FOR THE CONSTRUCTION WHERE THE SYSTEM IS TO BE INSTALLED.
   h. THE BOTTOM EDGE OF GYPSUM WALL BOARD SHALL BE INSTALLED 3/8" ABOVE THE FLOOR AND SEALED AS NOTED IN WALL TYPES.

C. RATINGS:
   a. SMOKE WALLS AND SMOKE BARRIERS: SMOKE WALLS AND SMOKE BARRIERS MUST FORM A COMPLETE BARRIER TO LIMIT THE TRANSFER OF SMOKE, INCLUDING PERIMETER DETAILS, PENETRATIONS, AND AS REQUIRED BETWEEN WALLS AND DOOR JAMBS, OR SIDELIGHT FRAMES. THE MEMBRANE IS TO BE CONTINUOUS THROUGH ALL CONCEALED SPACES.
      1. RECESSED CABINETS, OUTLET BOXES, AND OTHER PENETRATIONS MUST BE SEALED
      2. OPENINGS AROUND PENETRATIONS ARE TO BE SEALED.
      3. ALL EXPOSED JOINTS, ANGLES, AND ABUTMENTS IN THE SYSTEM, INCLUDING FLOOR AND ABOVE CEILING MUST BE TAPED AND FINISHED.
      4. SEAL THE INTERFACE BETWEEN WALLS AND DOOR JAMBS, OR SIDELIGHT FRAMES.
   b. FIRE WALLS AND FIRE BARRIERS: FIRE WALLS AND FIRE BARRIERS MUST BE SIMILARLY CONSTRUCTED AS A COMPLETE BARRIER TO RESIST THE SPREAD OF SMOKE AND FIRE. PENETRATIONS MUST BE SEALED AND LABELED WITH AN APPROVED FIRE RESISTANT JOINT SYSTEM. INSTALL A FIRE RESISTANT JOINT SYSTEM AT THE HEAD AND FLOOR CONDITION OF FIRE RATED WALLS AND BARRIERS.
   c. FIRE AND SMOKE WALL / BARRIER / WALLS LABELING: PROVIDE LABELS ABOVE ACOUSTIC CEILINGS IN LETTERS AT LEAST 2-INCHES IN HEIGHT AND NO MORE THAN 10-LINEAL FEET ALONG THE WALL. LABELS SHALL BE PLACED IN SUCH A MANNER AS TO BE OBVIOUS TO WORKERS IN THE CONCEALED SPACE ON BOTH SIDES OF THE WALL AND WILL READ AS FOLLOWS: "X" HR. FIRE [SMOKE] WALL [BARRIER] [WALL]. PENETRATIONS MUST BE FIRE [SMOKE] STOPPED." PROVIDE LABELING AT 12'-0" O.C. SPACING. ELECTRICAL, MECHANICAL OR PLUMBING PENETRATIONS THROUGH FIRE-RATED WALL OR FLOOR ASSEMBLIES SHALL BE SEALED WITH A U.L. APPROVED THROUGH-PENETRATION FIRESTOP SYSTEM APPROPRIATE FOR THE RATING OF THE WALL BEING PENETRATED. SUBMIT PROPOSED U.L. NUMBERS AND DETAILS TO ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
   d. ACOUSTICAL WALLS: WALLS INDICATED WITH ACOUSTICAL BATT, AND/OR A GIVEN AN STC RATING, SHALL BE CONSTRUCTED TO MINIMIZE SOUND TRANSMISSION AS FOLLOWS:
      1. PROVIDE ACOUSTICAL SEALANT AT ALL FLOOR AND HEAD LEVELS, EACH SIDE OF THE WALLS.
      2. SET TRACK IN 3 CONTINUOUS BEADS OF ACOUSTICAL SEALANT.
      3. EXTEND SOUND BATTS THOROUGH ANY INTERSECTING WALLS.
      4. STAGGER OUTLETS A MINIMUM OF 24 INCHES HORIZONTAL. DO NOT INSTALL MORE THAN ONE OUTLET IN A COMMON STUD CAVITY. SEAL JOINTS AROUND OUTLETS WITH ACOUSTICAL SEALANT.

D. GYPSUM BOARD WALL COMPONENTS AND ACCESSORIES:
   a. WALL TYPES DO NOT INDICATE FINAL FINISHES. REFER TO FINISH PLANS AND FINISH SCHEDULE.
   b. GYPSUM BOARD SHALL BE TYPE "X" FIRE RATED WITH:
      1. LEVEL 1 FINISH AT JOINTS WHICH WILL REMAIN CONCEALED. PROVIDE GALVANIZED STEEL CORNER BEADS AT CORNERS.
      2. LEVEL 3 FINISH WHERE WALLS EXPOSED TO VIEW SCHEDULED FOR PAINT IN SERVICE SPACES (eg. TELE / DATA CLOSETS, MECHANICAL ROOMS, JANITOR CLOSETS, STORAGE ROOMS).
      3. LEVEL 4 FINISH WHERE EXPOSED TO VIEW UPON PROJECT COMPLETION U.N.O.
      4. LEVEL 5 FINISH AT GRAPHIC CORRIDOR, AS WELL AS DRY ERASE AND CHALK BOARD PAINTED AREAS. REFER TO FINISH LOCATION ON PLANS, AND COORDINATE WITH DESIGNER IN THE FIELD.
   c. PROVIDE MOISTURE/ MOLD / ABUSE RESISTANT GYPSUM BOARD AT WALLS IN TOILET ROOMS, JANITORS CLOSETS AND ANY ROOM WHERE MOISTURE CONDITIONS WILL OCCUR AND NOT RECEIVING TILE FINISH.
   d. PROVIDE GLASS MATT GYPSUM BOARD AT WALLS DIRECTLY ADJACENT TO LIVING WALL ELEMENT AND AT ALL WET AREAS (SHOWER ROOMS, COMMUNAL KITCHEN/DISHWASHER, ETC.) GLASS MAT GYPSUM BOARD SHALL RECEIVE FIBERGLASS TAPE AND FINISH AS RECOMMENDED BY MANUFACTURER.
   e. METAL TRIM:
      1. EXPOSED METAL J-TRIM TO BE COMPLETELY COVERED WITH SKIM COAT
      2. NON-METALIC J-TRIM OR OTHER SHAPES ARE NOT ACCEPTABLE, UNLESS OTHERWISE NOTED
   f. LOCATIONS WHERE GYPSUM BOARD WALLS TERMINATE AT DISSIMILAR MATERIALS, PROVIDE A FINISH-ABLE METAL END TRIM AND A 1/4" GAP BETWEEN TRIM AND ADJACENT MATERIAL. FILL GAP WITH BACKER ROD AND SEALANT.
   g. PROVIDE SOLID FIRE TREATED WOOD BLOCKING IN WALL AND CEILING CONSTRUCTION AS REQUIRED TO SUPPORT WALL MOUNTED MILLWORK AND CASEWORK, FURNISHINGS, RAILINGS, GRAB BARS, TOILET & BATH ACCESSORIES OR ANY OTHER WALL MOUNTED ITEMS INDICATED ON THESE DRAWINGS REQUIRING BLOCKING.
   h. PROVIDE PAPER FACED "L" SHAPED TAPE ON TRIM AT THE TOP OF ALL GYP. BD. THAT ABUTS SUSPENDED CEILINGS AND EXPOSED STRUCTURE.

E. CONTROL JOINTS:
   a. PROVIDE IN GYPSUM WALL BOARD CONSTRUCTION AS FOLLOWS:
      1. PROVIDE CONTROL JOINTS IN EXPANSES OF WALLS AT MAXIMUM 25-FOOT INTERVALS, AND FULL HEIGHT. CONTROL JOINTS ARE RECOMMENDED AT DOOR JAMBS, EXTENDING FROM DOOR HEAD TO TOP OF WALL.
      2. CONTROL JOINTS ARE REQUIRED IN CEILINGS TO LIMIT AREAS TO 2,500 SQUARE FEET. INSTALL CONTROL JOINTS IN CEILINGS TO LIMIT DIMENSIONS IN EITHER DIRECTION TO 50 FEET MAXIMUM WITH PERIMETER RELIEF, 30 FEET MAXIMUM OTHERWISE. INSTALL CONTROL JOINTS WHERE CEILING FRAMING OR FURRING CHANGES DIRECTION.
      3. PROVIDE CONTROL JOINTS IN GYPSUM WALL BOARD WHERE THE UNDERLYING STRUCTURE CONTAINS A CONTROL OR MOVEMENT JOINT.
      4. IN AN ACOUSTICALLY RATED ASSEMBLY, PROVIDE ACOUSTICALLY TESTED CONTROL JOINT ASSEMBLY WITH A STC RATING MINIMALLY EQUAL TO THE WALLS STC RATING. COORDINATE REQUIRED LOCATIONS ON FEATURE WALLS WITH DESIGNER IN THE FIELD. METAL TRIM: EXPOSED METAL OR NON-METALLIC J-MOLD IS NOT ACCEPTABLE.
      5. PROVIDE CONTROL JOINTS AT ALL BUILDING CONTROL OR EXPANSION JOINTS.
   b. IN MASONRY WALLS, PROVIDE FULL HEIGHT CONTROL JOINTS AT MAXIMUM 30-FOOT INTERVALS. CONTROL JOINTS ARE RECOMMENDED AT DOOR JAMBS OF OPENINGS EXTENDING FULL HEIGHT OF WALL.

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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS

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Project Manager D EBERT	Discipline Lead B HUYLER
Designer E POST	Reviewer R KEUNEKE
Date Issued 9/18/2023	Project Number 23005898A

Sheet Name

GENERAL NOTES AND LEGENDS

Drawing Number

A001

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GENERAL DEMOLITION NOTES

A. CONTRACTOR SHALL COORDINATE REMOVAL OF FLOORS, WALLS AND CEILINGS WITH MECHANICAL, ELECTRICAL AND PLUMBING TRADES. ALL POWER, MECHANICAL AND PLUMBING LINES SHALL BE REMOVED BACK TO NEAREST MAIN BRANCH LINE OR PANEL.

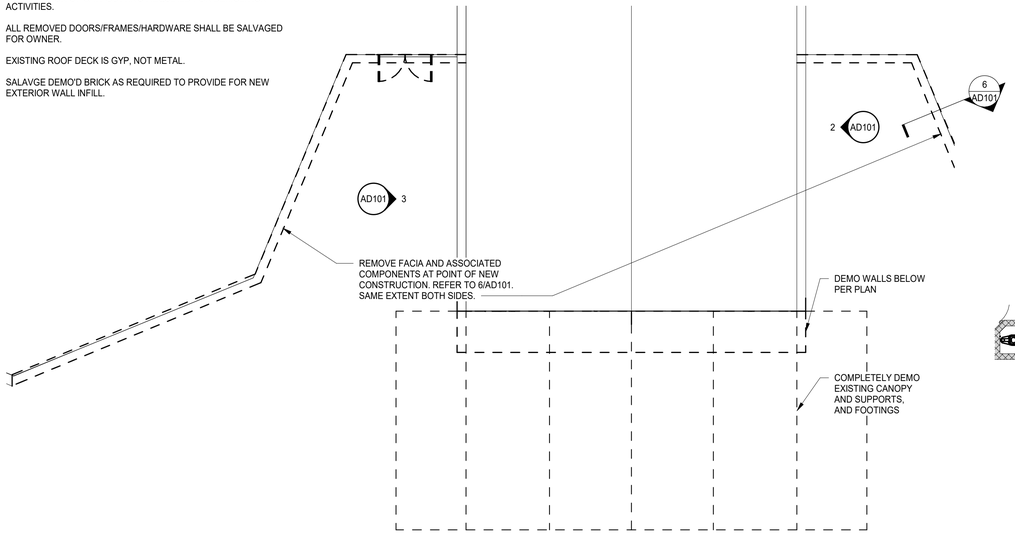
B. CONTRACTOR SHALL PROTECT EXISTING CONSTRUCTION AND EQUIPMENT NOTED TO REMAIN FROM DAMAGE RESULTING FROM DEMOLITION ACTIVITIES. ANY DAMAGE TO EXISTING PROPERTY RESULTING FROM DEMOLITION SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.

C. CONTRACTOR SHALL PROTECT ADJACENT SURFACES IN PREPARATION OF SAW CUTTING REQUIRED FOR DEMOLITION ACTIVITIES.

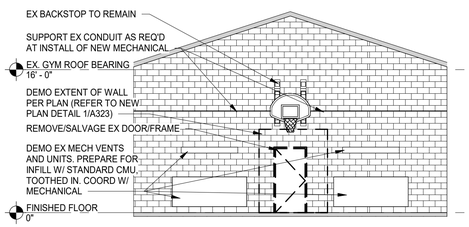
D. ALL REMOVED DOORS/FRAMES/HARDWARE SHALL BE SALVAGED FOR OWNER.

E. EXISTING ROOF DECK IS GYP, NOT METAL.

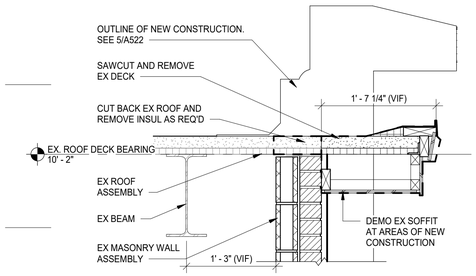
F. SALAVGE DEMO'D BRICK AS REQUIRED TO PROVIDE FOR NEW EXTERIOR WALL INFILL.



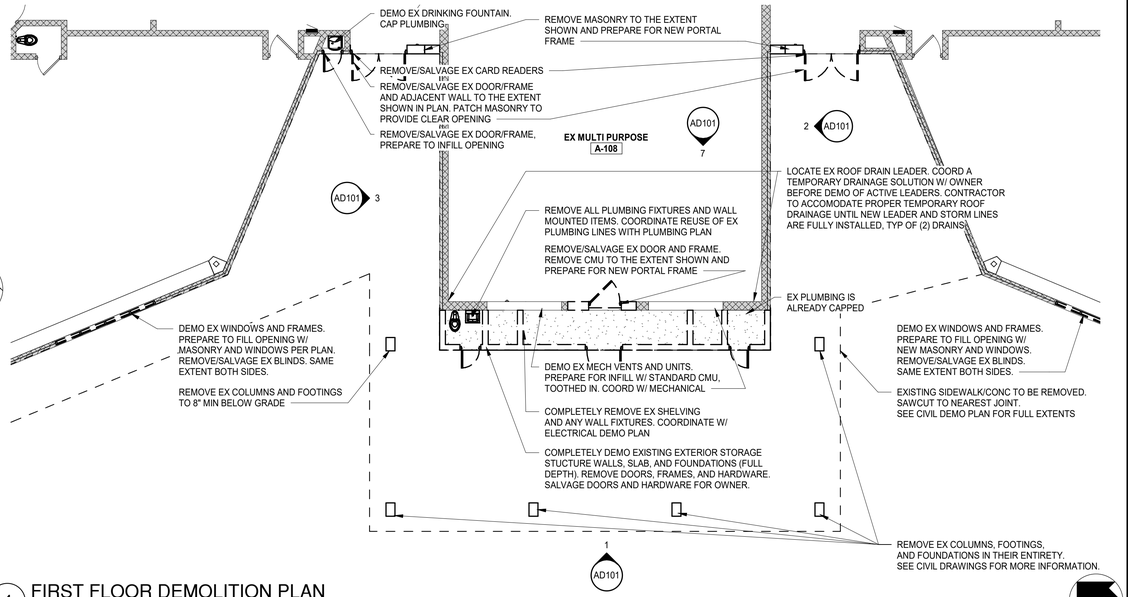
5 ROOF DEMOLITION PLAN
SCALE : 1/8" = 1'-0"



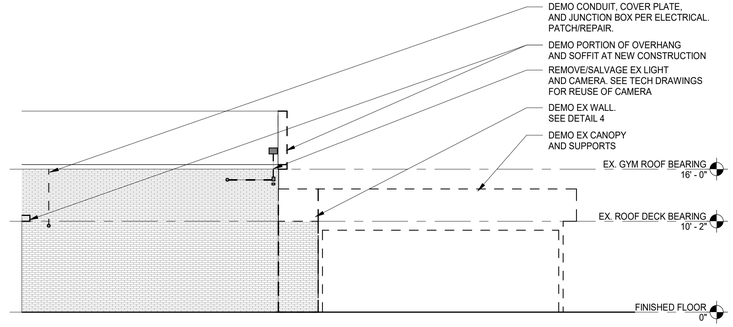
7 INTERIOR ELEVATION DEMO
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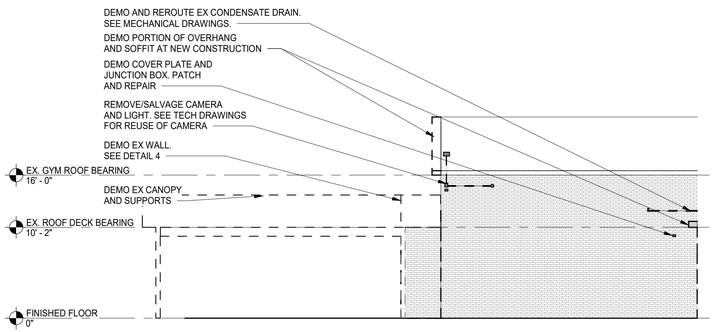
6 TOW - VEST/CLASSROOM DEMO
SCALE : 1" = 1'-0"



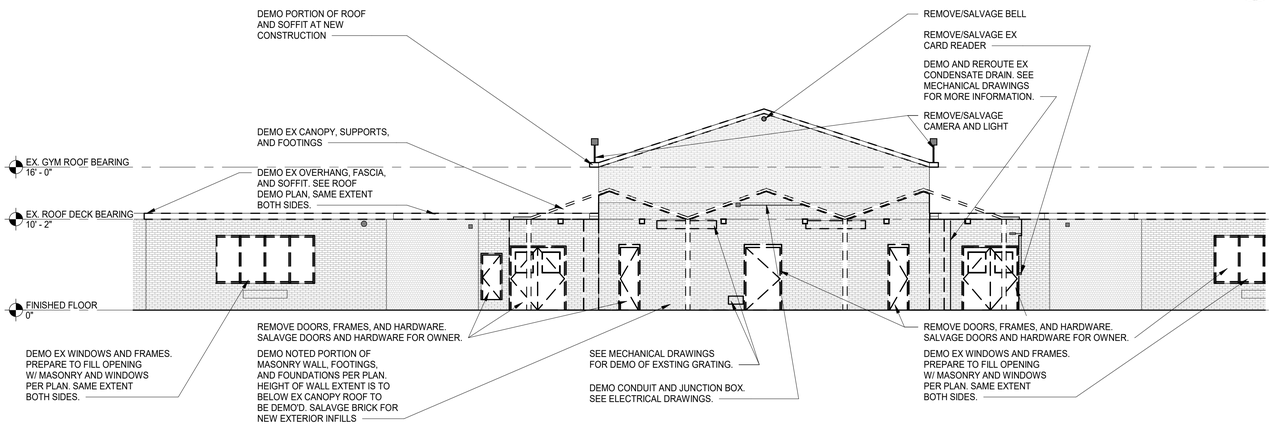
4 FIRST FLOOR DEMOLITION PLAN
SCALE : 1/8" = 1'-0"



3 EXTERIOR ELEVATION DEMO - NORTH WEST
SCALE : 1/8" = 1'-0"



2 EXTERIOR ELEVATION DEMO - SOUTH EAST
SCALE : 1/8" = 1'-0"



1 EXTERIOR ELEVATION DEMO - SOUTH WEST
SCALE : 1/8" = 1'-0"

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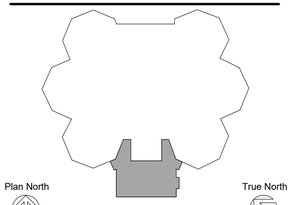
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

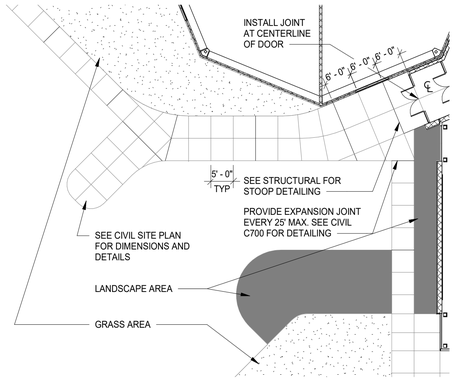
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DEMOLITION PLANS AND ELEVATIONS

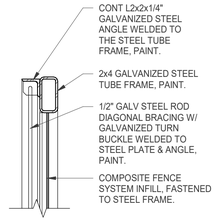
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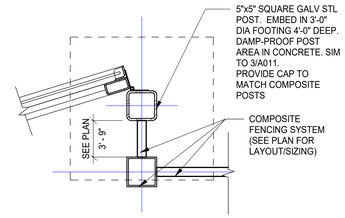
ARCH D 24x36



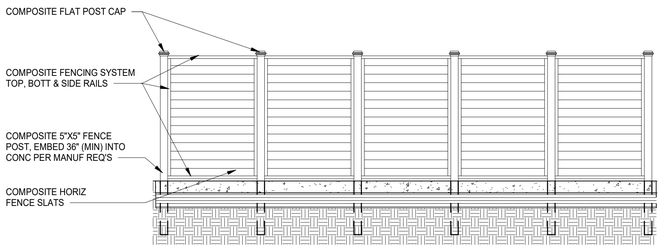
9 ENTRY - SIDEWALK SCORING PLAN
SCALE : 1/16" = 1'-0"



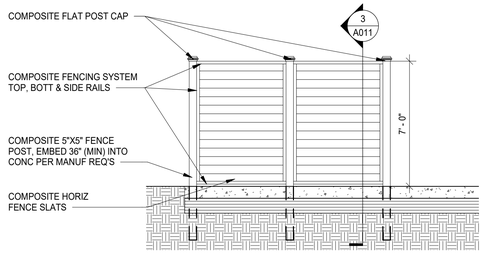
8 DUMPSTER ENCLOSURE GATE TOP RAIL DETAIL
SCALE : 1 1/2" = 1'-0"



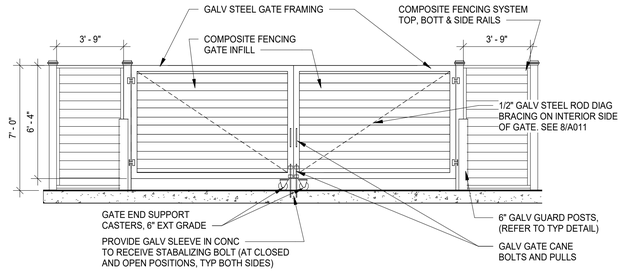
7 DUMPSTER ENCLOSURE GATE POST PLAN DETAIL
SCALE : 1" = 1'-0"



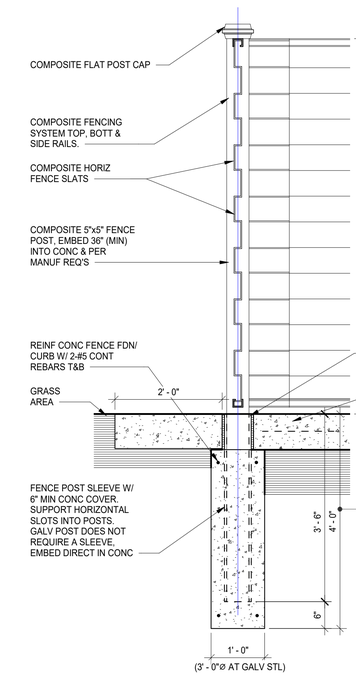
6 DUMPSTER ENCLOSURE EL EAST
SCALE : 1/4" = 1'-0"



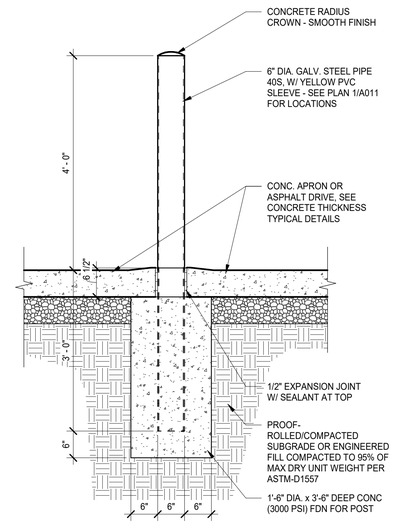
5 DUMPSTER ENCLOSURE EL NORTH
SCALE : 1/4" = 1'-0"



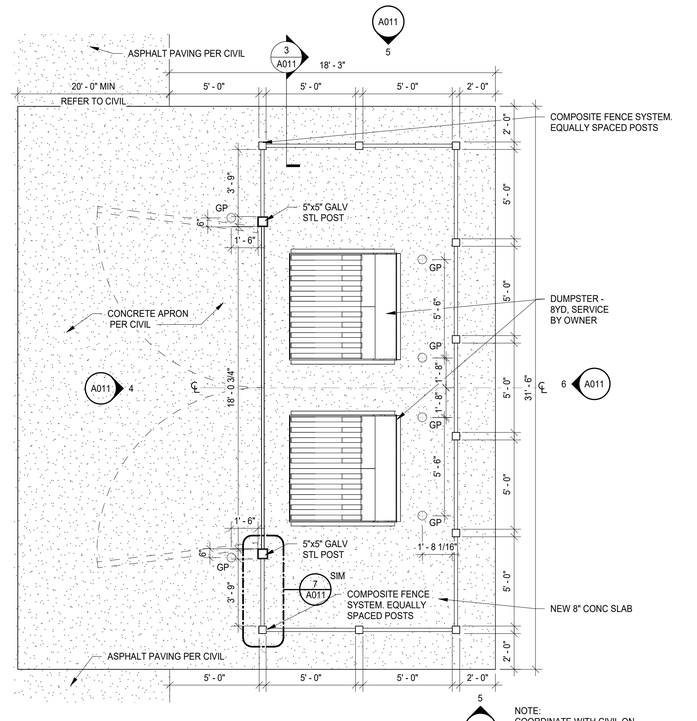
4 DUMPSTER GATE ELEVATION
SCALE : 1/4" = 1'-0"



3 DUMPSTER ENCLOSURE SECTION, TYP
SCALE : 3/4" = 1'-0"



2 TYP GUARD POST DETAIL
SCALE : 3/4" = 1'-0"



1 DUMPSTER ENCLOSURE ENLARGED PLAN
SCALE : 1/4" = 1'-0"

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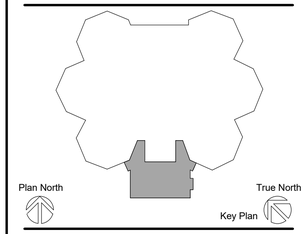
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
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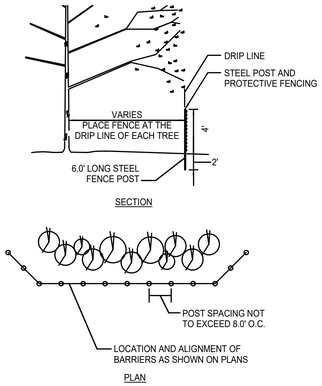
Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

ARCHITECTURAL SITE PLAN DETAILS

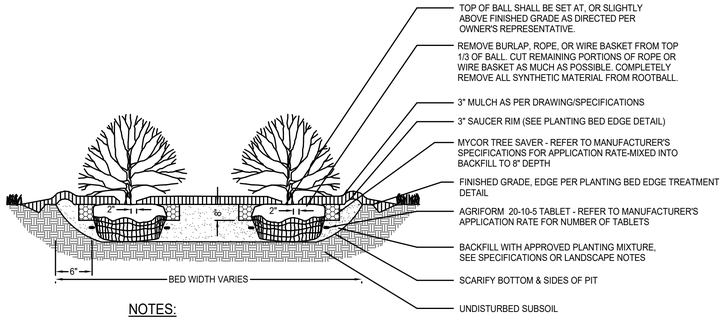
Drawing Number

A011



VEGETATION PROTECTION BARRIER DETAIL

N.T.S.

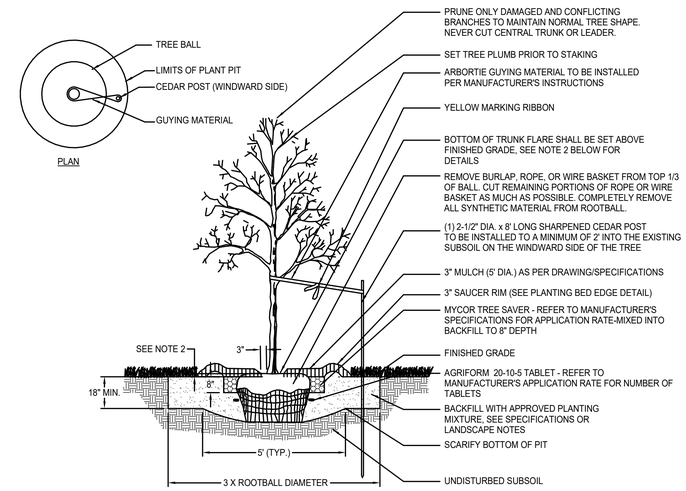


NOTES:

1. MAINTAIN A 2" MINIMUM RADIUS CLEAR OF MULCH AROUND THE TRUNK.
2. PLANTING BED DEPTH IN LAWN AREAS SHALL BE A MINIMUM OF 18" DEEP AND/OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
3. ALL PLANTING BEDS SHALL BE FREE OF CONSTRUCTION DEBRIS.

SHRUB PLANTING

N.T.S.



NOTES:

1. MAINTAIN A 3" MINIMUM RADIUS CLEAR OF MULCH AROUND THE TRUNK.
2. THE DISTANCE BETWEEN THE BOTTOM OF THE TRUNK FLARE AND THE FINISHED GRADE SHALL BE AS FOLLOWS:
   FOR SANDY OR LOAMY SOILS: 1"
   FOR CLAY OR POORLY DRAINED SOILS: 3"
   - THE CONTRACTOR SHALL REVIEW THE APPROPRIATE PLANTING DEPTH WITH THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
3. WHEN TAGGING TREES AT THE NURSERY, MARK THE NORTH SIDE OF THE TREE IN THE FIELD AND WHEN INSTALLING, ROTATE TREE TO FACE NORTH WHENEVER POSSIBLE.

DECIDUOUS TREE PLANTING LESS THAN 4" CAL.

N.T.S.

LANDSCAPE NOTES

A. ALL PLANTS MUST BE HEALTHY, VIGOROUS, AND FREE OF PESTS AND DISEASE.

B. STANDARDS SET FORTH IN "AMERICAN STANDARD FOR NURSERY STOCK," ANSI, 760.1 (LATEST EDITION), REPRESENT GUIDELINE SPECIFICATIONS ONLY AND SHALL CONSTITUTE MINIMUM QUALITY REQUIREMENTS FOR PLANT MATERIAL.

C. ALL PLANTS MUST BE HARDY UNDER CLIMATE CONDITIONS THAT EXIST AT THE PROJECT SITE AND GROWN AT A NURSERY AT THE SAME HARDINESS ZONE AS THE PROJECT LOCATION.

D. NO SUBSTITUTIONS SHALL BE PERMITED WITHOUT PRIOR WRITTEN APPROVAL OF THE OWNER OR OWNER'S REPRESENTATIVE.

E. ALL TREES MUST BE STRAIGHT TRUNKED, INJURY FREE, AND FULL HEADED.

F. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL QUANTITIES SHOWN ON THESE PLANS BEFORE PRICING THE WORK.

G. ANY DISCREPANCY WITH QUANTITIES, LOCATIONS, AND/OR FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

H. MULCH ALL PLANTINGS WITH DOUBLE GROUND BARK MULCH MADE FROM A MIXTURE OF HARDWOOD AND/OR SOFTWOOD. MULCH SHALL BE AGED A MIN. OF ONE (1) YEAR FOR PARTIAL DECOMPOSITION. IT SHALL BE SCREENED TO EXCLUDE PARTICLES LARGER THAN ONE (1) INCH IN DIAMATER. MATERIAL SHALL BE COMPOSED OF BARK AND HAVE A LOW WOOD CONTENT WITH NO HIDDEN WOODS FROM CONSTRUCTION DEBRIS, PALLETS, OR PRESSURE TREATED LUMBER AND BE FREE OF WEEDS, SEEDS, AND GREEN LEAF MATTER. IT SHALL BE NATURALLY DARK BROWN IN COLOR. NO DYED MULCH WILL BE ACCEPTED. MULCH DEPTH SHALL BE THREE (3) INCHES UNLESS OTHERWISE DIRECTED.

I. ANY PLANT WHICH DIES, TURNS BROWN, OR DEFOLIATES (PRIOR TO TOTAL ACCEPTANCE OF THE WORK) SHALL BE PROMPTLY REMOVED FROM THE SITE AND REPLACED WITH MATERIAL OF THE SAME SPECIES, QUANTITY, AND SIZE MEETING ALL PLANT LIST SPECIFCIATIONS.

J. THE CONTRACOR IS RESPONSIBLE FOR FULLY MAINTAINING ALL PLANT MATERIALS (INCLUDING, BUT NOT LIMTED TO: WATERING, SPRAYING, MULCHING, FERTILIZING, AND REMOVAL OF STAKES AND GUYS) AND LAWN AREAS UNTIL FINAL ACCEPTANCE BY THE OWNER.

K. THE CONTRACTOR SHALL COMPLETELY GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF ONE (1) YEAR, BEGINNING ON THE DATE OF FINAL ACCEPTANCE. THE CONTRACTOR SHALL PROMPTLY MAKE ALL REPLACEMENTS BEFORE THE END OF THE GUARANTEE PERIOD,

L. ALL AREAS DISTURBED BY UTILITY INSTALLATION AND SITE GRADING SHALL RECEIVE APPROVED TOPSOIL (TO A COMPACTED DEPTH OF FOUR (4) INCHES, UNLESS OTHERWISE SPECIFIED BY THE GOVERNING MUNICIPALITY), BE FINE GRADED, SEEDED, MULCHED, AND WATERED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.

M. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING, AT THEIR EXPENSE, A CERTIFIED SOIL TEST ANALYSIS OF ON SITE AND/OR IMPORTED TOPSOIL. TOPSOIL ANALYSIS TO INCLUDE THE FOLLOWING DATA:
   1) PH FACTOR
   2) MECHANICAL ANALYSIS, INCLUDING SIEVE ANALYSIS PROVIDING SEPARATE SAND, SILT, AND CLAY PERCENTAGES
   3) PERCENTAGE OF ORGANIC CONTENT BY WEIGHT
   4) NUTRIENT LEVELS INCLUDING NITROGEN, PHOSPHOROUS, AND POTASSIUM

N. SHOULD TESTS AND ANALYSIS INDICATE THAT SOIL PROPOSED FOR USE IS DEFICIENT IN ANY OF THE ABOVE REQUIREMENTS, A SYSTEM OF AMELIORATING MAY BE PROPOSED FOR APPROVAL. ANY SYSTEM PROPOSED SHALL PROVIDE FOR AN ACIDITY RANGE OF PH 6.0 TO 6.8 INCLUSIVE.

O. PLANTING MIX FOR PLANT PITS SHALL BE COMPOSED OF (2) PARTS IMPORTED OR ON-SITE SCREENED TOPSOIL AND (1) PART COMPOST. THE RATIO OF TOPSOIL TO COMPOST IS SUBJECT TO CHANGE BASED ON THE TESTIGN RESULTS FOR TOPSOIL.

P. LOCATION OF EXISTING BURIED UTILITIES SHOWN ON THE PLAN ARE BASED UPON BEST AVAILABLE INFORMATION AND ARE TO BE CONSIDERED APPROXIMATE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATIONS OF ALL UNDERGROUND UTILITY LINES ADJACENT TO THE WORK AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY AND ALL DAMAGE TO UTILITIES, STRUCTURES, AND SITE APPURTENANCES, ETC. WHICH OCCURS AS A RESULT OF THE LANDSCAPE INSTALLATION.

Q. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL PLANT MATERIAL PER DETAILS. ANY DEVIATIONS FROM THE DETAIL MUST BE APPROVED BY THE OWNER'S REPRESENTATIVE OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

R. UPON FINAL ACCEPTANCE OF THE LANDSCAPE INSTALLATION, THE OWNER WILL ASSUME MAINTENANCE OF THE LANDSCAPED AREAS.

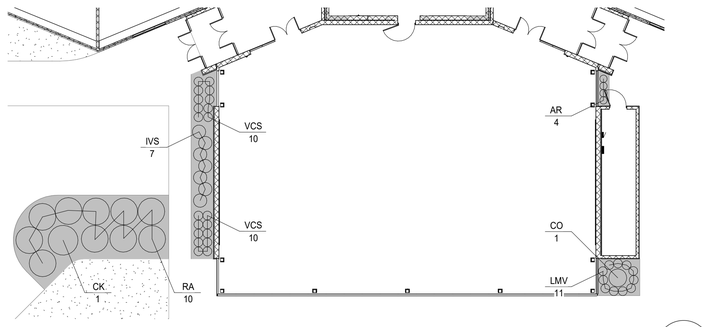
S. EXISTING TREES TO REMAIN SHALL BE PROTECTED BY INSTALLING A TEMPORARY FENCE AT THE OUTER LIMITS OF THE TREE CANOPY.

T. REFER TO SHEET A012 FOR LANDSCAPE DETAILS.

U. SOIL WITHIN BEDS ADJACENT TO THE BUILDING SHALL BE PREPARED TO A DEPTH OF TWO (2) FEET AND REPLACED WITH SPECIFIED PLANTING MIX. SEE NOTE O.

V. MAINTAIN A MINIMUM OF TWO (2) FEET AWAY FROM BUILDING AND SIDEWALK EDGE FOR MATURE SPREAD OF PLANT.

PLANT LIST						
KEY	BOTANICAL NAME	COMMON NAME	MATURE SIZE		INSTALLED SIZE	CONDITION
			HEIGHT	SPREAD		
ORNAMENTAL TREES						
CK	QUERCUS X WAREI 'NADLER' PP17,604	KINDRED SPIRIT OAK	30' HT.	6' SPRD.	8-10' HT.	B&B
DECIDUOUS / EVERGREEN SHRUBS						
CO	CHAMAECYPARIS OBTUSA 'COMPACTA'	COMPACT HINOKI CYPRESS	6-8' HT.	4-6' SPRD.	24"-30" HT.	CONT.
IVS	ITEA VIRGINICA 'SMNIVDFC' SCENTLANDIA	SCENTLANDIA VIRGINIA SWEETSPIRE	2-3' HT.	2-3' SPRD.	24"-30" HT.	CONT.
RA	RHUS AROMATICA 'GRO-LOW'	GRO-LOW FRAGRANT SUMAC	1.5-2' HT.	6-8' SPRD.	NO. 5 (30" SPRD.)	CONT.
VCS	VIBURNUM CASSINOIDES 'SMNVCDD' LIL DITTY	LIL DITTY VIBURNUM	1-2' HT.	1-2' SPRD.	18" HT.	CONT.
PERENNIALS / GROUNDCOVERS						
AR	ASTILBE 'RHEINLAND'	RHEINLAND ASTILBE	1.5-2' HT.	1.5-2' SPRD.	NO. 1	CONT.
LMV	LIRIPOE MUSCARI 'VARIEGATA	VARIEGATED LILY TURF	1-1.5' HT.	1-2' SPRD.	NO. 2	CONT.



1 LANSCAPE PLAN
SCALE : 1/16" = 1'-0"

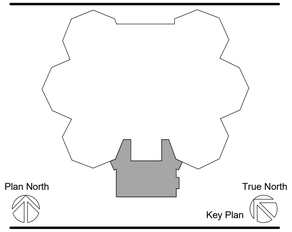
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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
MARK JOHNS	E POST
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

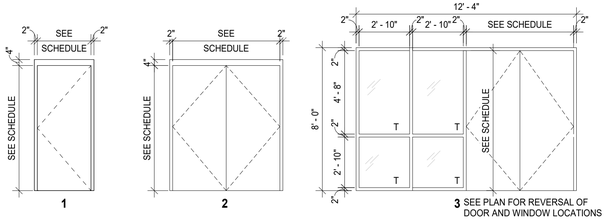
ARCHITECTURAL SITE PLAN DETAILS - LANDSCAPING

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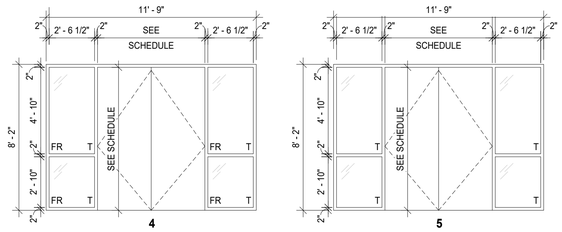
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1 2 3 SEE PLAN FOR REVERSAL OF DOOR AND WINDOW LOCATIONS

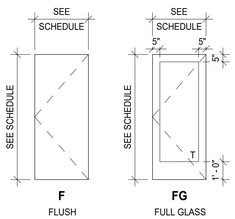


4 5

DOOR - FRAME TYPES

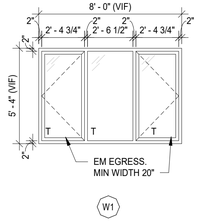
DOOR SCHEDULE

	DOOR					FRAME				GENERAL		
DOOR #	WIDTH	HEIGHT	THK.	TYPE	MAT-FIN	TYPE	MAT-FIN	DETAIL	HD WR	RATING	REMARKS	DOOR #
122	6' - 0"	7' - 0"	1 3/4"	F	HM - PT	2	HM - PT	2/A101; 5/A101	04	90 MIN	DOUBLE DOORS, MAGNETIC HOLD OPENS FULL SWING TO WALL	122
123A	6' - 0"	8' - 0"	1 3/4"	FG	ALUM - FF	4	ALUM - FF	9/A101; 8/A101	07	90 MIN	DOUBLE DOORS, CARD READER, ACTUATOR FOR RIGHT SIDE DOORS 123A AND 123B	123A
123B	6' - 0"	8' - 0"	1 3/4"	FG	ALUM - FF	5	ALUM - FF	9/A101; 8/A101	05		DOUBLE DOORS, ACTUATOR FOR RIGHT SIDE DOORS 123A AND 123B	123B
124A	6' - 0"	7' - 10"	1 3/4"	FG	ALUM - FF	3	ALUM - FF	3/A101; 6/A101	03		DOUBLE DOORS	124A
124B	6' - 0"	7' - 10"	1 3/4"	FG	ALUM - FF	3	ALUM - FF	3/A101; 6/A101	03		DOUBLE DOORS	124B
124C	3' - 8"	7' - 0"	1 3/4"	F	HM - PT	1	HM - PT	2/A101; 11/A101	01	90 MIN	MAGNETIC HOLD OPEN	124C
125	6' - 0"	7' - 0"	1 3/4"	F	HM - PT	2	HM - PT	2/A101; 5/A101	04	90 MIN	DOUBLE DOORS, MAGNETIC HOLD OPENS FULL SWING TO WALL	125
126A	6' - 0"	8' - 0"	1 3/4"	FG	ALUM - FF	4	ALUM - FF	9/A101; 8/A101	08	90 MIN	DOUBLE DOORS, CARD READER	126A
126B	6' - 0"	8' - 0"	1 3/4"	FG	ALUM - FF	5	ALUM - FF	9/A101; 8/A101	06		DOUBLE DOORS	126B
127	3' - 8"	7' - 0"	1 3/4"	F	FRP	1	ALUM - FF	4/A101; 7/A101	02		ARMOR PLATE, 110 D SWING	127

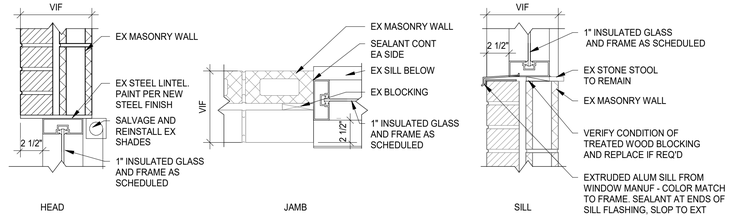


F FLUSH FG FULL GLASS

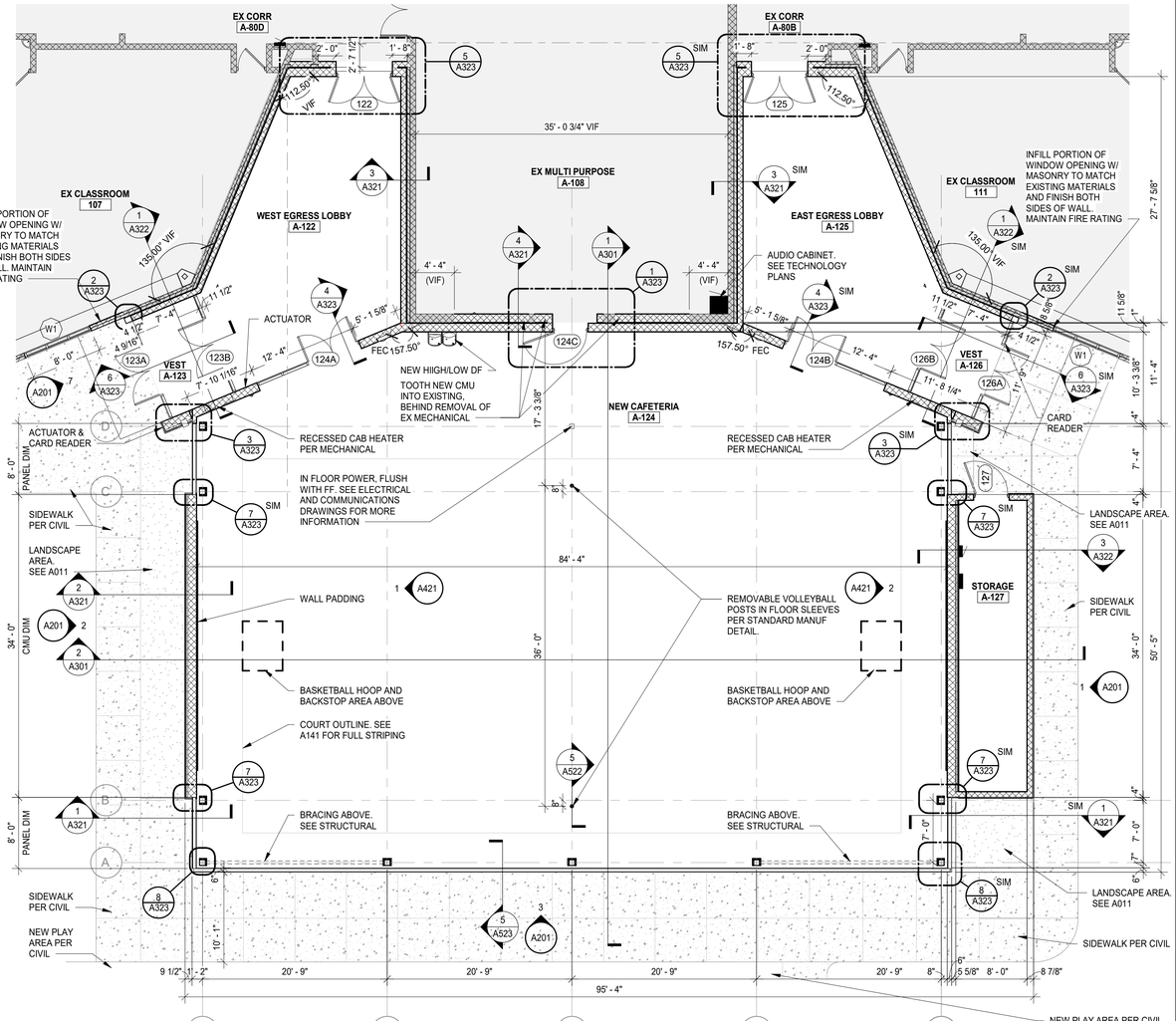
DOOR - TYPES



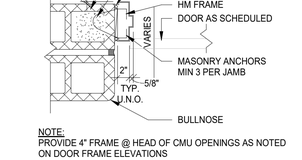
WINDOW - TYPES



W1 - DETAILS

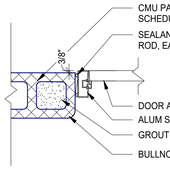


1 FIRST FLOOR PLAN
SCALE : 1/8" = 1'-0"

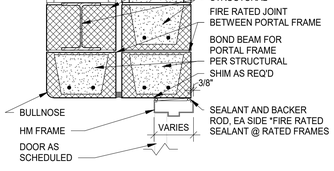


NOTE:
PROVIDE 4" FRAME @ HEAD OF CMU OPENINGS AS NOTED ON DOOR FRAME ELEVATIONS

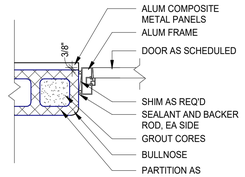
2 JAMB - HM @ NEW CMU
SCALE : 1" = 1'-0"



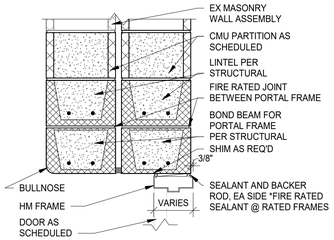
3 JAMB - ALUM @ NEW CMU
SCALE : 1" = 1'-0"



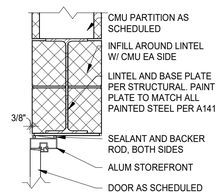
11 HEAD - HM @ NEW CMU ALT
SCALE : 1" = 1'-0"



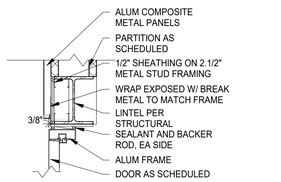
4 JAMB - ALUM @ NEW CMU AND METAL PANEL
SCALE : 1" = 1'-0"



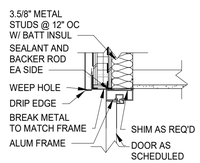
5 HEAD - HM @ NEW CMU
SCALE : 1" = 1'-0"



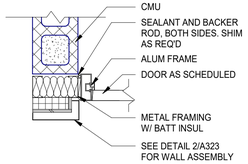
6 HEAD - ALUM @ NEW CMU
SCALE : 1" = 1'-0"



7 HEAD - ALUM @ NEW CMU AND METAL PANEL
SCALE : 1" = 1'-0"



8 HEAD - ALUM @ NEW ENTRY VEST
SCALE : 1" = 1'-0"



9 JAMB - ALUM @ NEW ENTRY VEST
SCALE : 1" = 1'-0"

GENERAL NOTES

A. REFER TO A011 FOR ARCHITECTURAL SITE DETAILS.

B. REFER TO A120 SERIES OF DRAWINGS FOR REFLECTED CEILING PLANS AND DETAILS.

C. REFER TO A140 SERIES OF DRAWINGS FOR FINISH PLANS, SCHEDYLES, AND DETAILS.

D. ALL DOORS TO BE LOCATED MIN 4" FROM ADJACENT WALL SURFACE UNLESS OTHERWISE NOTED.

E. FURNITURE SHOWN FOR REFERENCE ONLY. NOT IN CONTRACT.

F. REFER TO SPECIFICATIONS FOR HARDWARE SETS.

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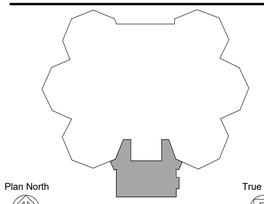
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

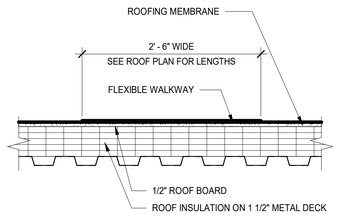
FIRST FLOOR PLAN AND DETAILS

Drawing Number

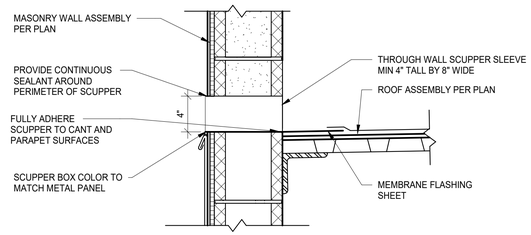
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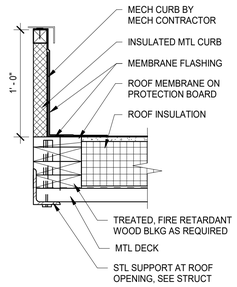
ARCH D 24x36



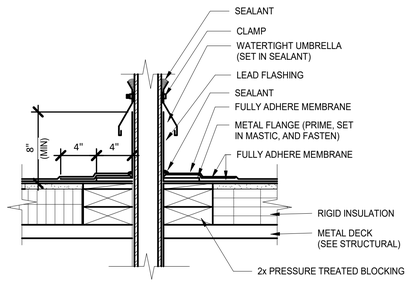
5 ROOF WALKWAY DETAIL
SCALE : 1" = 1'-0"



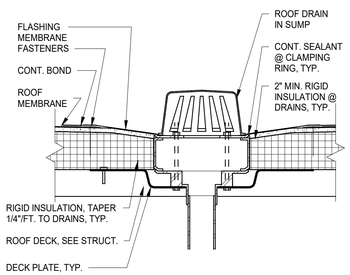
6 TYP OVERFLOW SCUPPER BOX DETAIL
SCALE : 1 1/2" = 1'-0"



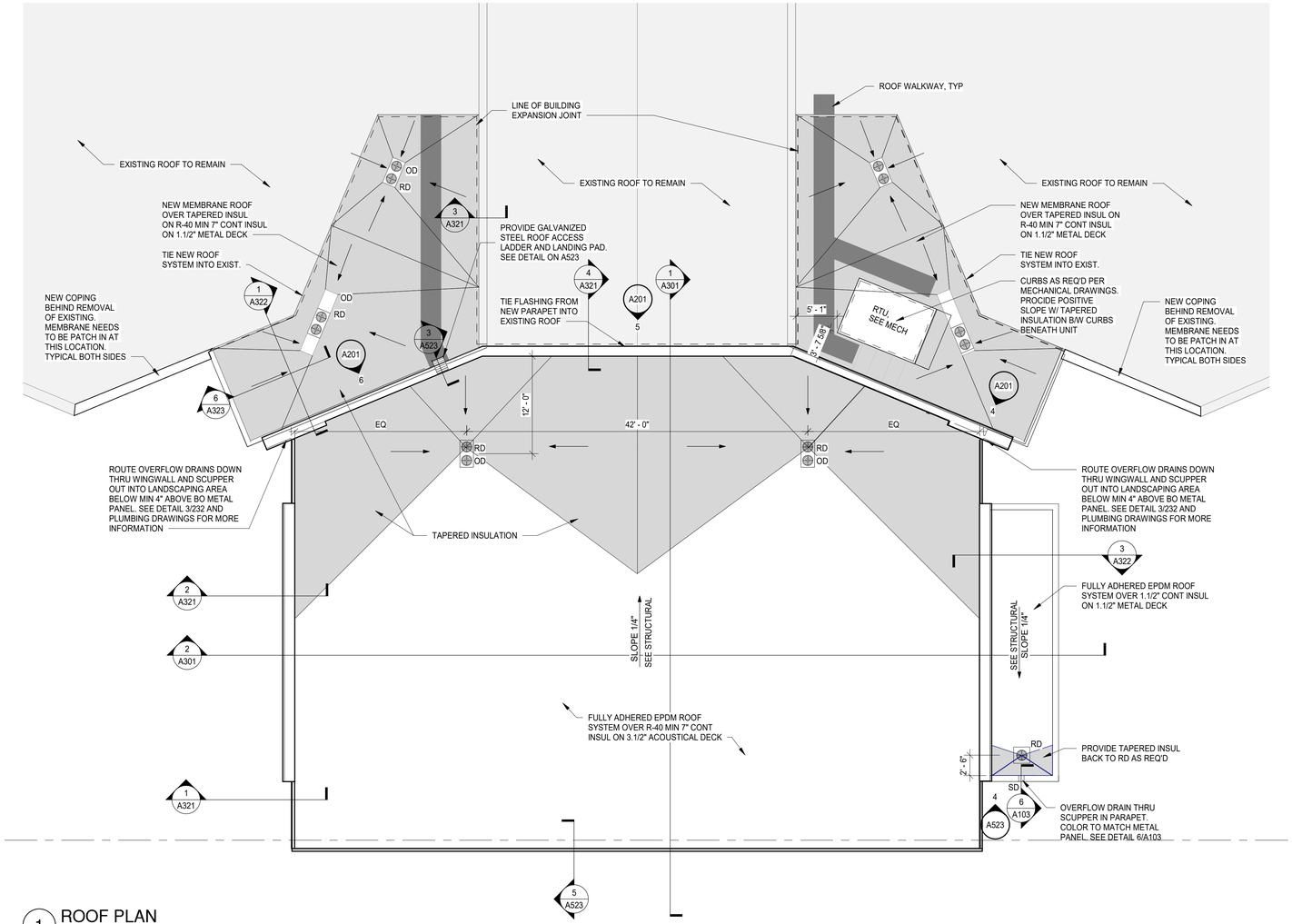
4 ROOF EQUIP CURB FLASHING DETAIL
SCALE : 1 1/2" = 1'-0"



3 TYP PIPE FLASHING DETAIL
SCALE : 1 1/2" = 1'-0"



2 TYP ROOF DRAIN DETAIL
SCALE : 1 1/2" = 1'-0"



1 ROOF PLAN
SCALE : 1/8" = 1'-0"

GENERAL ROOF NOTES

A. PROVIDE SADDLES AS REQ'D TO PROVIDE POSITIVE DRAINAGE TO ROOF DRAINS AT ALL MECHANICAL UNITS, EXHAUST FANS, VENTS, ETC. MAINTAIN POSITIVE SLOPE OF 1/4" PER FOOT MINIMUM.

B. SEE MECHANICAL AND PLUMBING DRAWINGS FOR EXACT SIZES AND LOCATIONS OF RTU'S, EXHAUST FANS, VENT STACKS, ETC. - COORDINATE WITH STRUCTURAL.

C. USE TREATED WOOD BLOCKING AT ALL LOCATIONS REQUIRING WOOD BLOCKING.

D. SEE MECHANICAL AND PLUMBING DRAWINGS FOR LOCATIONS OF ANY ADDITIONAL ROOF PENETRATIONS.

E. PROVIDE ROOFING MANUFACTURER'S STANDARD ROOFING TERMINATION DETAILS AT ALL PARAPETS, GRAVEL STOPS, CURBS, PIPE, PENETRATIONS, ETC.

F. PROVIDE LAPPED AND SEALED JOINTS PER SMACNA REQUIREMENTS AND MANUFACTURER REQUIREMENTS.

G. SEE ROOF DETAILS FOR SUPPORTS. COORDINATE WITH MECHANICAL CONTRACTOR FOR FINAL LOCATIONS

H. PROVIDE STEEL ANGLE SUPPORTS UNDER EQUIPMENT CURBS, SUPPORTS, FRAMES, OPENINGS, ETC. TO SUPPORT AND FRAME OUT STRUCTURE AT ROOF. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION. COORDINATE WITH MECHANICAL, PLUMBING, AND ELECTRICAL DOCUMENTS FOR REQUIREMENTS.

I. ABBREVIATIONS:
   a. OD = OVERFLOW DRAIN
   b. RD = ROOF DRAIN
   c. SD = SCUPPER DRAIN
   d. RTU - ROOF TOP UNIT

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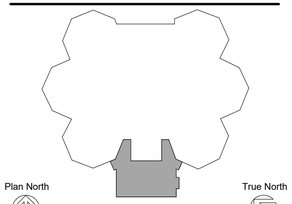
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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

ROOF PLAN

Drawing Number

A103

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LEGEND

NOTE: SEE OTHER DISCIPLINE DRAWINGS (E.G. MECHANICAL, PLAUMBING AND ELECTRICAL DRAWINGS) FOR ASSOCIATED SYSTEMS AND INFORMATION ABOUT SYMBOLS NOT INDICATED IN THIS LEGEND.

GYPSUM BOARD CEILING/SOFFIT

OPEN TO DECK

GENERAL NOTES

A. GYP. BD. BULKHEADS AND SOFFITS SHALL ALIGN WITH FINISH FACE OF ADJACENT WALL(S).

B. ALL EXPOSED STRUCTURAL STEEL (INCLUDING STEEL DECKS) AND MECHANICAL PIPING, EXCEPT SPIRAL DUCTS TO BE PAINTED: REFER TO BASIS OF DESIGN

C. GYP. BD. CEILING AND BULKHEADS TO BE PAINTED: REFER TO BASIS OF DESIGN

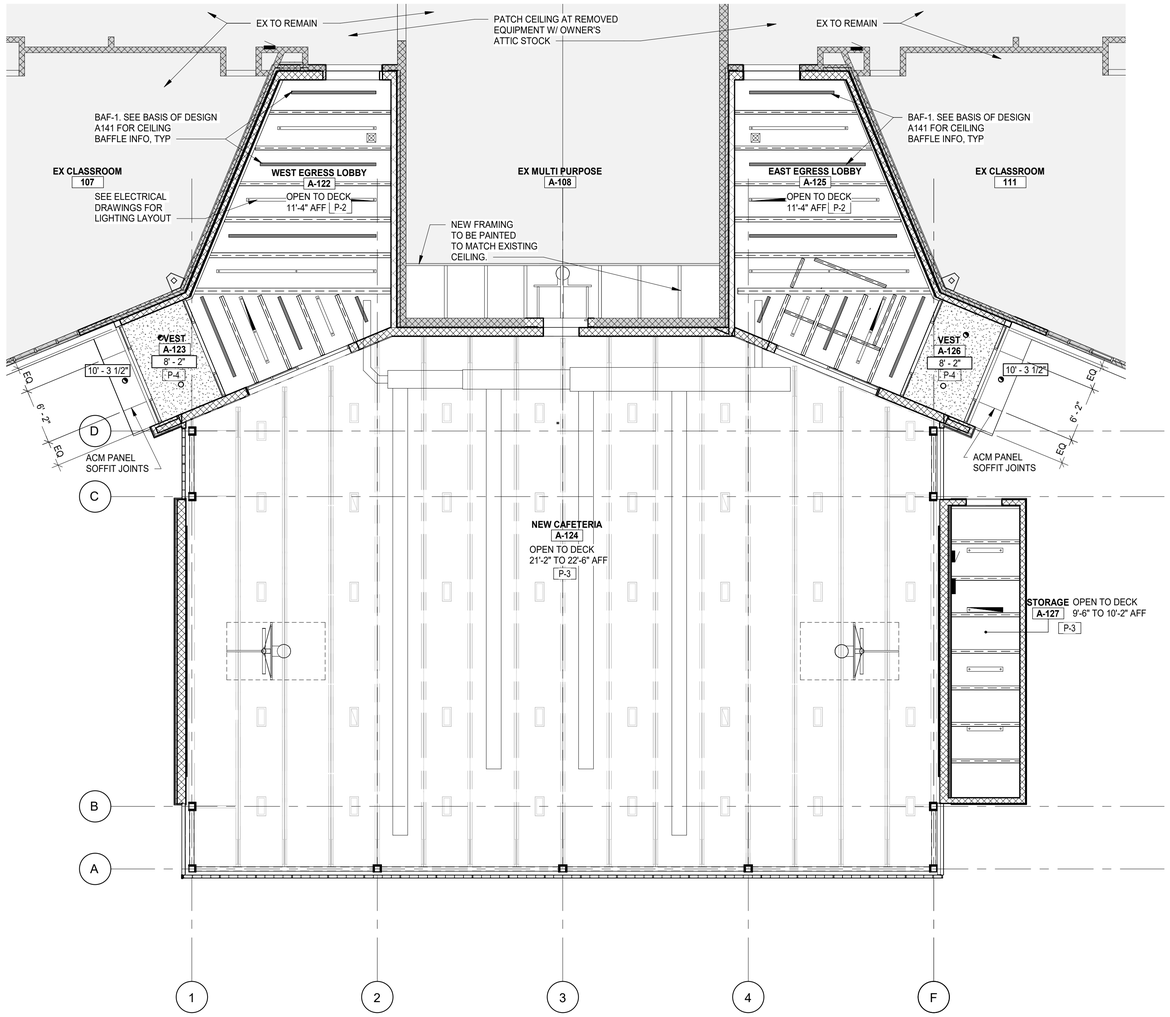
D. ALL CEILING HEIGHTS ARE FROM FINISHED FLOOR ELEVATION.

E. SEE ELECTRICAL DRAWINGS FOR MORE INFORMATION ON ELECTRICAL/LIGHTING FIXTURES.

F. SEE MECHANICAL DRAWINGS FOR MORE INFO ON DUCTS, DIFFUSERS, ETC.

G. REFER TO A140 SERIES OF DRAWINGS FOR FINISH PLANS, SCHEDULES, AND DETAILS.

H. COORDINATE CEILING REMOVAL AND REINSTALLATION W/ CONDUIT ROUTING FROM EXISTING ELECTRICAL ROOM.



1 FIRST FLOOR PARTIAL REFLECTED CEILING PLAN
SCALE : 1/8" = 1'-0"

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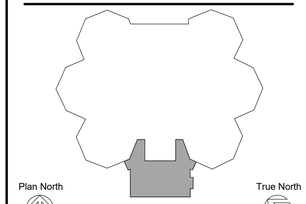
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Date Revised	Description
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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

FIRST FLOOR CEILING PLAN

Drawing Number

A121

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BASIS OF DESIGN

033543 POLISHED CONCRETE

PC-1:
- MANUFACTURER: SOLOMON COLORS
- STYLE: PRODYE PLUS
- COLOR: DSL-8010 GRAY
- FINISH: HARD TROWEL/POLISHED
- LOCATION:
- NOTE:

042223.13 EXPOSED AGGREGATE CONCRETE UNIT MASONRY

BB-1: BURNISHED BLOCK
- MANUFACTURER: GRAND BLANC CEMENT PRODUCTS
- COLOR: GREYSTONE WHITE
- NOTE:

096513 RESILIENT BASE

RB-1: RESILIENT WALL BASE; 4" H
- MANUFACTURER: JOHNSONITE
- STYLE: TRADITIONAL 4" DC
- COLOR: MATCH EXISTING
- TOE STYLE: COVE
- NOTE:

096566 RESILIENT ATHLETIC FLOORING

RAF-1: RESILIENT RUBBER FLOORING
- MANUFACTURER: TARKETT SPORTS
- COLLECTION: OMNISPORTS MULTI-USE
- COLOR: GOLDEN MAPLE
- LOCATION:
- NOTE: BLUE GAME LINES - SEE STRIPING PLAN

RAF-2: RESILIENT RUBBER FLOORING
- MANUFACTURER: TARKETT SPORTS
- COLLECTION: OMNISPORTS MULTI-USE
- COLOR: BLUE MAPLE
- LOCATION:
- NOTE: BLACK/WHITE GAME LINES - SEE STRIPING PLAN

RAF-3: RESILIENT RUBBER FLOORING
- MANUFACTURER: TARKETT SPORTS
- COLLECTION: OMNISPORTS MULTI-USE
- COLOR: BLACK
- LOCATION:
- NOTE:

098433 INTERIOR PAINT

P-1: FIELD-INTERIOR PAINT
- MANUFACTURER: SHERWIN-WILLIAMS
- COLOR: SW 9541 WHITE SNOW
- FINISH: PER PAINT SPEC
- LOCATION:

P-2: CLG/DECK-INTERIOR PAINT
- MANUFACTURER: SHERWIN-WILLIAMS
- COLOR: CYBERSPACE SW7076
- FINISH: PER PAINT SPEC
- LOCATION:

P-3: CLG/DECK-INTERIOR PAINT
- MANUFACTURER: SHERWIN-WILLIAMS
- COLOR: EXTRA WHITE SW7006
- FINISH: PER PAINT SPEC
- LOCATION:

P-4: CLG/GYP-INTERIOR PAINT
- MANUFACTURER: SHERWIN-WILLIAMS
- COLOR: EXTRA WHITE SW7006
- FINISH: PER PAINT SPEC
- LOCATION:

P-5: FIELD-INTERIOR PAINT
- MANUFACTURER: SHERWIN-WILLIAMS
- COLOR: MATCH EXISTING (BLUE)
- FINISH: PER PAINT SPEC
- LOCATION: EX MULTIPURPOSE (SOUTH WALL)

098436 SOUND-ABSORBING CEILING UNITS

BAF-1: ACOUSTICAL CEILING BAFFLE
- MANUFACTURER: FOCAL POINT
- STYLE: SEEM 2 ACOUSTIC UNLIT
- COLOR: DEEP PURPLE (DPP)
- SIZE:
- NOTE:

116623 GYMNASIUM EQUIPMENT

WP-1:
- MANUFACTURER: RESILITE
- STYLE: WAINSCOT WALL PADDING
- COLOR: ROYAL BLUE 14 OZ.
- LOCATION:
- NOTE:

124813 ENTRANCE MATS & GRIDS

WOF: VINYL GRID SYSTEMS W/ CARPET
- MANUFACTURER: PORTICO SYSTEMS
- COLLECTION: SNAP TRAX PLUS TILE
- COLOR: GREY
- LOCATION: VESTIBULES
- NOTE:

096519 RESILIENT TILE FLOORING

LVT-1: LVT PLANK; 6"x48" (20 MIL)
- MANUFACTURER: TARKETT
- STYLE: iD LATITUDE WOOD
- COLOR: TBD
- LOCATION: EAST/WEST EGRESS LOBBIES
- NOTE:

TRANSITION STRIP

TS-1:
- MANUFACTURER: SCHLUTER
- STYLE: VINPRO-U
- COLOR:
- LOCATION:
- NOTE:

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOOR	BASE	WALLS				CEILING	REMARKS
				NORTH	SOUTH	EAST	WEST		
FINISHED FLOOR									
A-80B	EX CORR	EXISTING	RB-1*	EXISTING	CMU (P1)	EXISTING	EXISTING	ACT TO MATCH EX	*ON NEW CMU
A-80D	EX CORR	EXISTING	RB-1*	EXISTING	CMU (P1)	EXISTING	EXISTING	ACT TO MATCH EX	*ON NEW CMU
A-108	EX MULTI PURPOSE	EXISTING	RB-1*	EXISTING	CMU (P5)	EXISTING	EXISTING	OTD, P-3	*ON FULL SOUTH WALL
A-122	WEST EGRESS LOBBY	LVT-1	RB-1*	CMU (P1)	BURNISHED BLOCK	CMU (P1)	CMU (P1)	OTD, P-2	*ON NEW CMU
A-123	VEST	WOF	RB-1*	CMU (P1)	BURNISHED BLOCK	-	-	GYP, P-4	*ON NEW CMU
A-124	NEW CAFETERIA	RAF-1/RAF-2/RAF-3	RB-1	BURNISHED BLOCK	-	BURNISHED BLOCK	BURNISHED BLOCK	OTD, P-3	WALL PADS ON CMU AND COLS
A-125	EAST EGRESS LOBBY	LVT-1	RB-1*	CMU (P1)	BURNISHED BLOCK	CMU (P1)	CMU (P1)	OTD, P-2	*ON NEW CMU
A-126	VEST	WOF	RB-1*	CMU (P1)	BURNISHED BLOCK	-	-	GYP, P-4	*ON NEW CMU
A-127	STORAGE	CONC	RB-1	BURNISHED BLOCK	BURNISHED BLOCK	BURNISHED BLOCK	PLY WD	OTD, P-3	

FINISH ABBREVIATIONS

ACT	ACOUSTIC CEILINGTILE
AST	ANTISTATIC TILE
B	WALL BASE
BB	BURNISHED BLOCK
BAF	ACOUSTICAL CEILING BAFFLE
C	CARPET
CB	CERAMIC BASE
CER	CERAMIC
CG	CORNER GUARD
CJ	CONTROL JOINT
CL	CENTER LINE
CLG	CEILING
CLR	CLEAR
CMT	CERAMIC MOSAIC TILE
CS	CULTURED STONE
CT	CERAMIC TILE
F	FABRIC
FT	FLOOR TILE
HPC	HIGH PERFORMANCE COATING
HW	HARDWARE
LAM	LAMINATE
LMC	LINEAR METAL CEILING
LVT	LUXURY VINYL TILE
OTD	OPEN TO DECK
P	PAINT
PB	PORCELAIN BASE
PC	POLISHED CONCRETE
PLAM	PLASTIC LAMINATE
PP	PLASTIC PANELING
PY	PORCELAIN TILE
QT	QUARRY TILE
RB	RUBBER BASE
RAF	RESILIENT ATHLETIC FLOORING
RF	RESILIENT FLOORING
SC	SEALED CONCRETE
SS	SOLID SURFACE
STS	STAINLESS STEEL
TS	TRANSITION STRIP
TH	THRESHOLD
UP	UPHOLSTERY
VB	VINYL BASE
VCT	VINYL COMPOSITION TILE
VD	VISUAL DISPLAY
VT	VINYL TILE
WB	WOOD BASE
WC	WALL COVERING
WD	WOOD
WDT	WINDOW TREATMENT
WF	WOOD FLOORING
WOF	WALK OFF MAT
WP	WALL PADDING
WT	WALL TILE

FINISH SYMBOL LEGEND

- XX# — FLOOR FINISH
- XX# — WALL BASE FINISH
- XX# — FLOOR FINISH ONLY
- X# — GENERAL WALL FINISH
- X# — ACCENT WALL FINISH - TO EXTENTS
- X# — WALL FINISH ABOVE WAINSCOT
- X# — WAINSCOT FINISH
- X# — WINDOW TREATMENT
- X# — SIGNAGE TAG

FINISH HATCH LEGEND

- PC-1/CONC
- WOF
- RAF
- LVT

GENERAL NOTES

A. COMPLY WITH MANUFACTURER'S RECOMMENDATIONS FOR PREPARING AND INSTALLING FINISHES.

B. PROTECT ADJACENT WORK BY SUITABLY COVERING DURING WORK.

C. REMOVE ADHESIVE OR PAINT SPOTS FROM FINISHED FLOORS, WALLS, GLASS OR OTHER SURFACES. FINISHES TO MEET OR EXCEED CODE REQUIREMENTS.

D. INSTALL MATERIALS USING MANUFACTURER'S APPROVED ADHESIVES AND METHODS, U.O.N.

E. FILL MINOR DRYWALL IRREGULARITIES WITH SPACKLING COMPOUND AND SAND TO A SMOOTH LEVEL SURFACE. EXERCISE CARE TO AVOID RAISING THE NAP OF PAPER

F. DO NOT PERFORM PAINTING AND OTHER FINISHING WORK UNDER CONDITIONS UNSUITABLE FOR EXECUTION OF PAINTING WORK. AIR SHALL BE FREE FROM DUST AND DIRT TO PREVENT LODGING OF FOREIGN MATTER IN FRESH PAINT. FLOORS MUST BE BROOM CLEAN BEFORE PAINTING IS STARTED.

G. PAINT DESIGNATIONS INDICATE COLOR ONLY, REFER TO SPECIFICATION FOR FINISH TYPE.

H. EDGES OF PAINT ADJOINING OTHER COLORS OR MATERIALS TO BE SHARP AND CLEAN WITHOUT OVERLAP.

I. EXAMINE SURFACES TO RECEIVE PAINT CAREFULLY FOR DEFECTS. DO NOT PROCEED WITH WORK UNTIL DEFECTS ARE CORRECTED.

J. WHENEVER NECESSARY TO OBTAIN REQUIRED RESULTS, REFINISH AN ENTIRE WALL RATHER THAN SPOT FINISHING WHERE A PORTION OF THE FINISH HAS BEEN DAMAGED OR IS UNSATISFACTORY.

K. PREPARE FLOOR SURFACES INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
   A. PREPARE/PROPERLY REPAIR AND PATCH SUBFLOORS TO A SMOOTH AND LEVEL FINISH.
   B. FLASH PATCH AS REQUIRED, READY TO RECEIVE NEW FINISH.

L. PROVIDE SELF LEVELING TROWELABLE UNDERLAYMENT WHERE REQUIRED TO OBTAIN FINISH MANUFACTURER'S REQUIRED SUBFLOOR CONDITION.

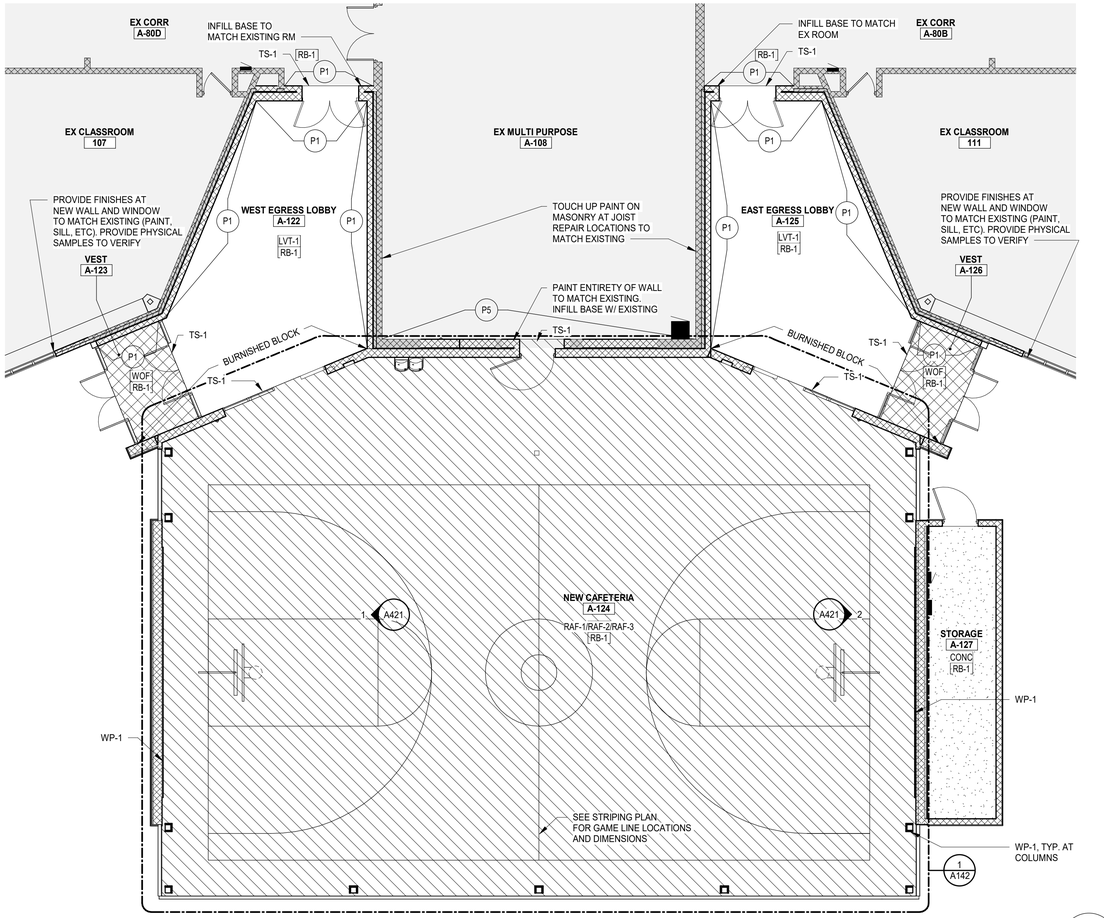
M. PROVIDE THE REQUIRED TRANSITIONS BASED ON TYPES IDENTIFIED ON DRAWINGS AT EACH FINISH TRANSITION LOCATION

N. CENTER FLOOR MATERIAL TRANSITIONS ON DOOR ABOVE.

O. FINISHED FLOORS EXTEND INTO TOE SPACES, CLOSETS, DOOR REVEALS AND SIMILAR OPENINGS.

P. REFER TO REFLECTED CEILING PLANS FOR CEILING FINISHES.

Q. REFER TO ELEVATIONS FOR WALL PADDING.



1 FIRST FLOOR FINISH PLAN
SCALE: 1/8" = 1'-0"

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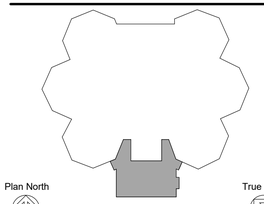
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
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Date Revised	Description
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Project Manager	Discipline Lead
D EBERT	B HUYLER
Designer	Reviewer
J BOWRON	E POST
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

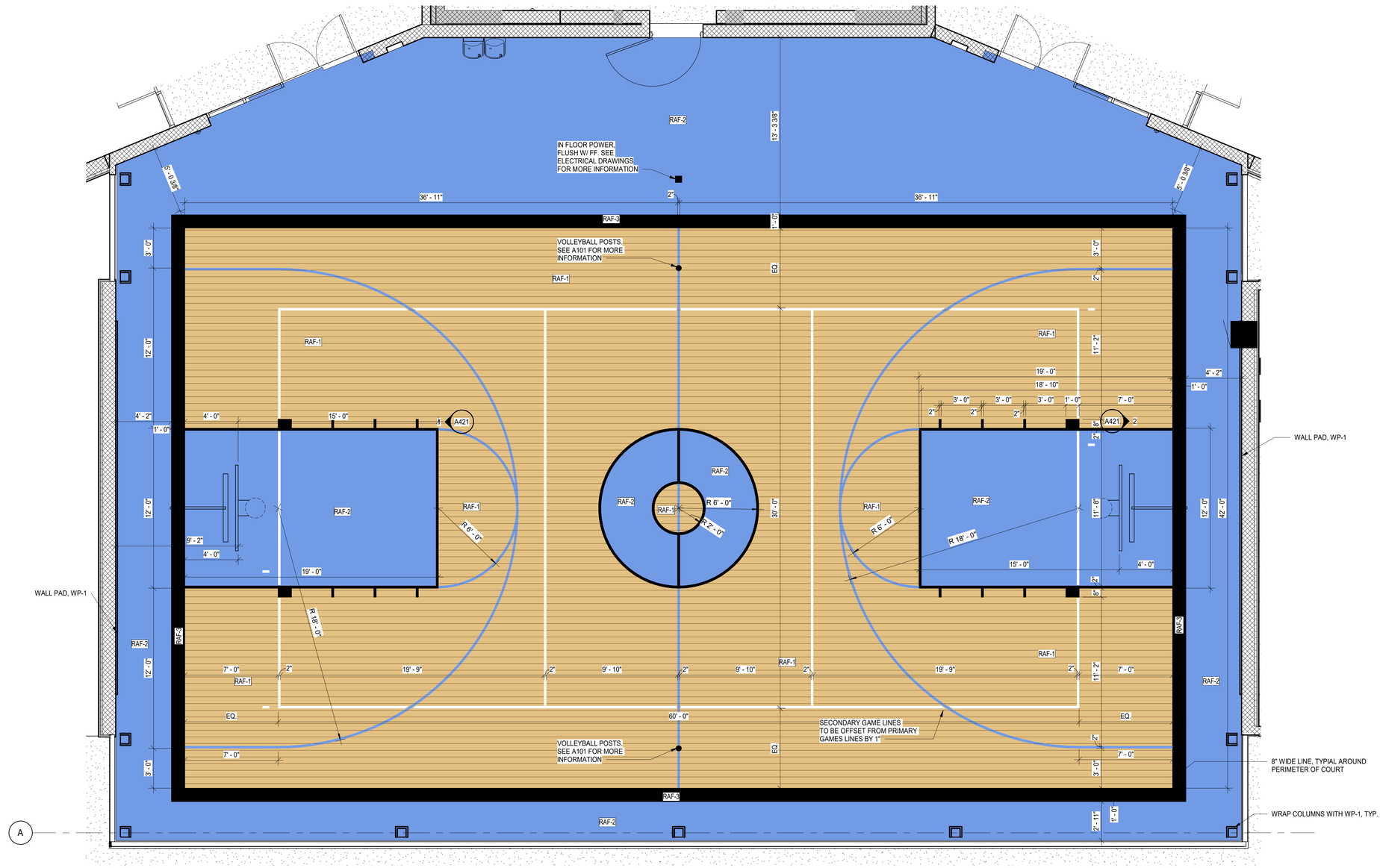
FIRST FLOOR FINISH PLAN

Drawing Number

A141

9/21/2023 11:58:01 AM

ARCH D 24x36



1 CAFETERIA STRIPING PLAN
SCALE : 1/4" = 1'-0"

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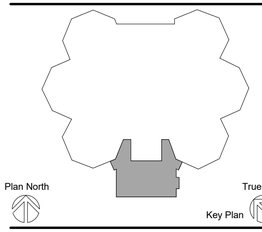
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Designer	Reviewer
J BOWRON	E POST
Date Issued	Project Number
9/18/2023	23005898A

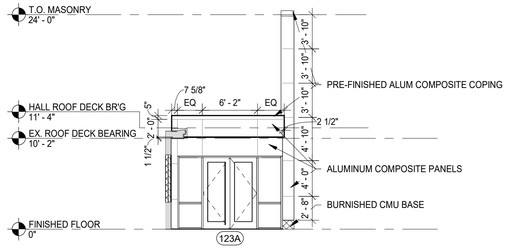
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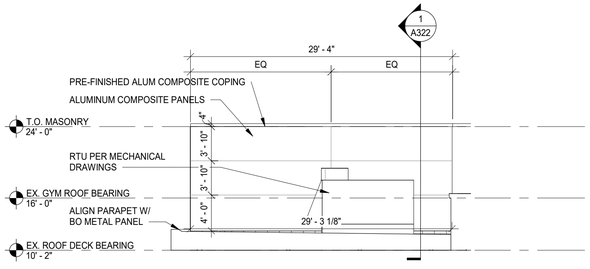
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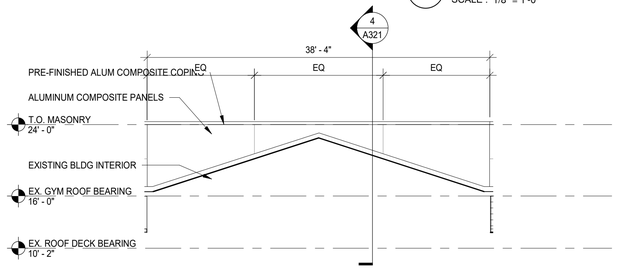
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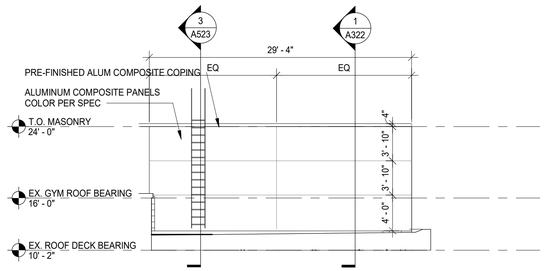
7 PARTIAL EL - WEST ENTRY (SIM EAST)
SCALE : 1/8" = 1'-0"



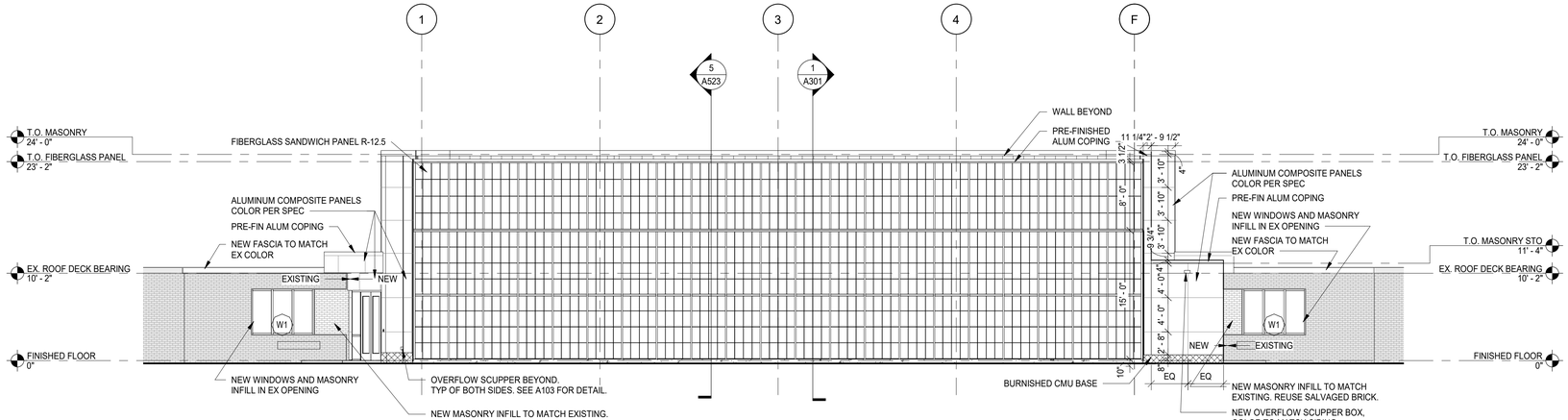
4 EAST EL ABOVE VESTIBULE
SCALE : 1/8" = 1'-0"



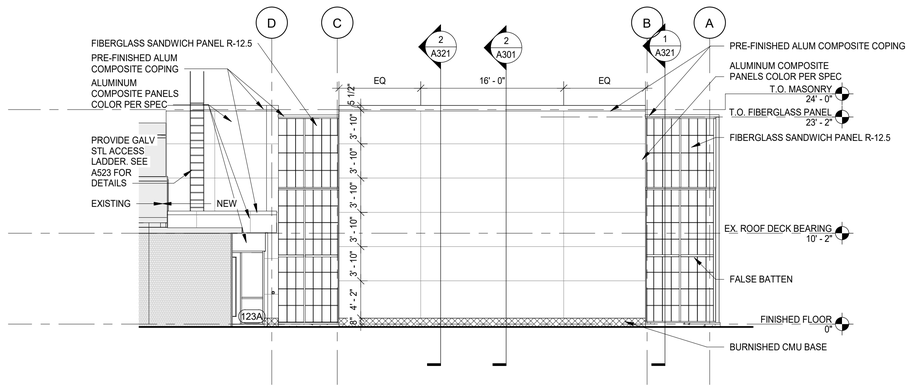
5 NORTH EL ABOVE EX GYM ROOF
SCALE : 1/8" = 1'-0"



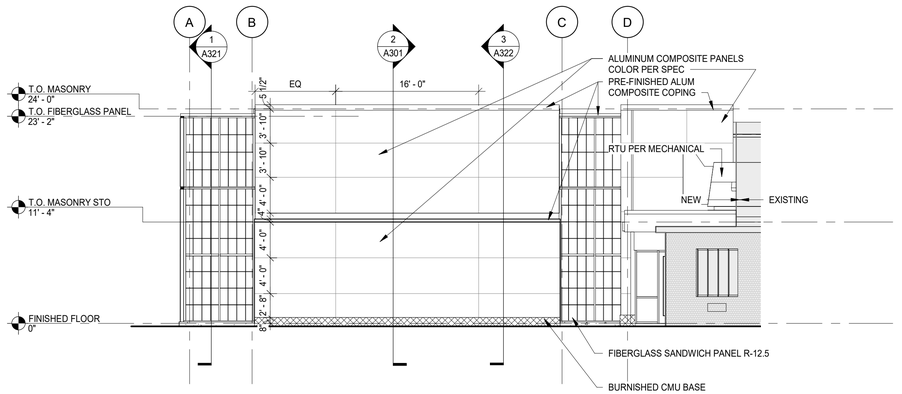
6 WEST EL ABOVE VESTIBULE
SCALE : 1/8" = 1'-0"



3 EXTERIOR ELEVATION - SOUTH
SCALE : 1/8" = 1'-0"



2 EXTERIOR ELEVATION - WEST
SCALE : 1/8" = 1'-0"



1 EXTERIOR ELEVATION - EAST
SCALE : 1/8" = 1'-0"

GENERAL NOTES

A. REFER TO A101 FOR DOOR AND SIDELIGHT ELEVATIONS AND DETAILS

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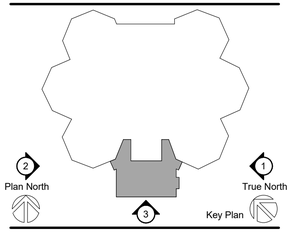
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ATTWOOD ELEMENTARY CAFETERIA ADDITION
SO-1790

915 ATTWOOD DR
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D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

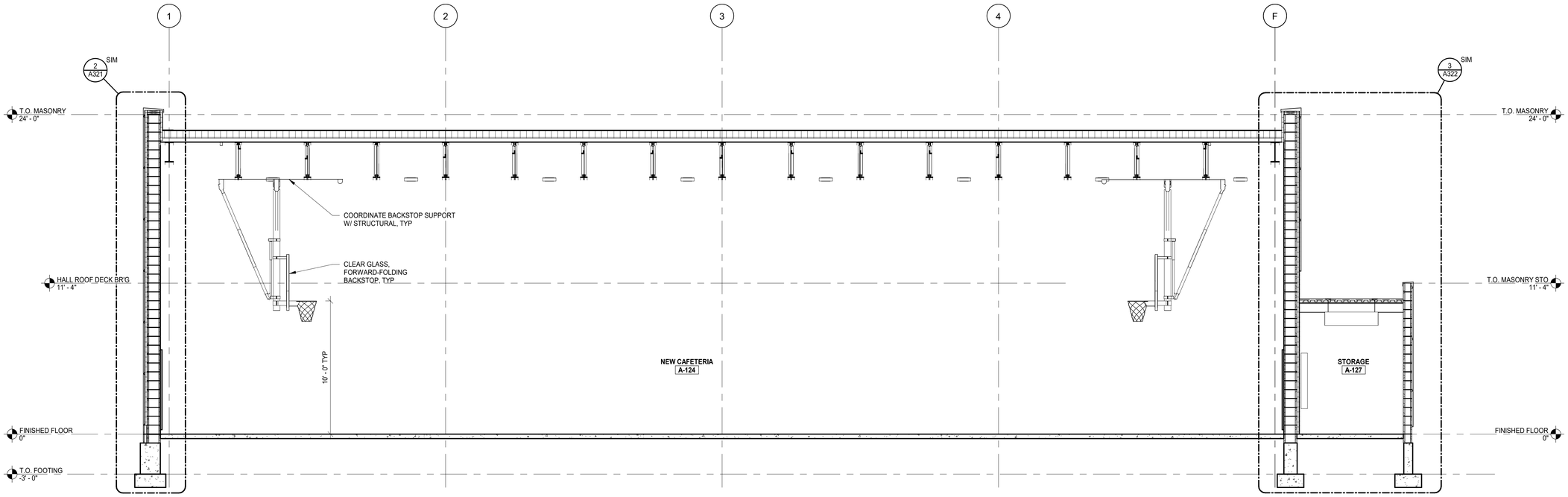
EXTERIOR ELEVATIONS

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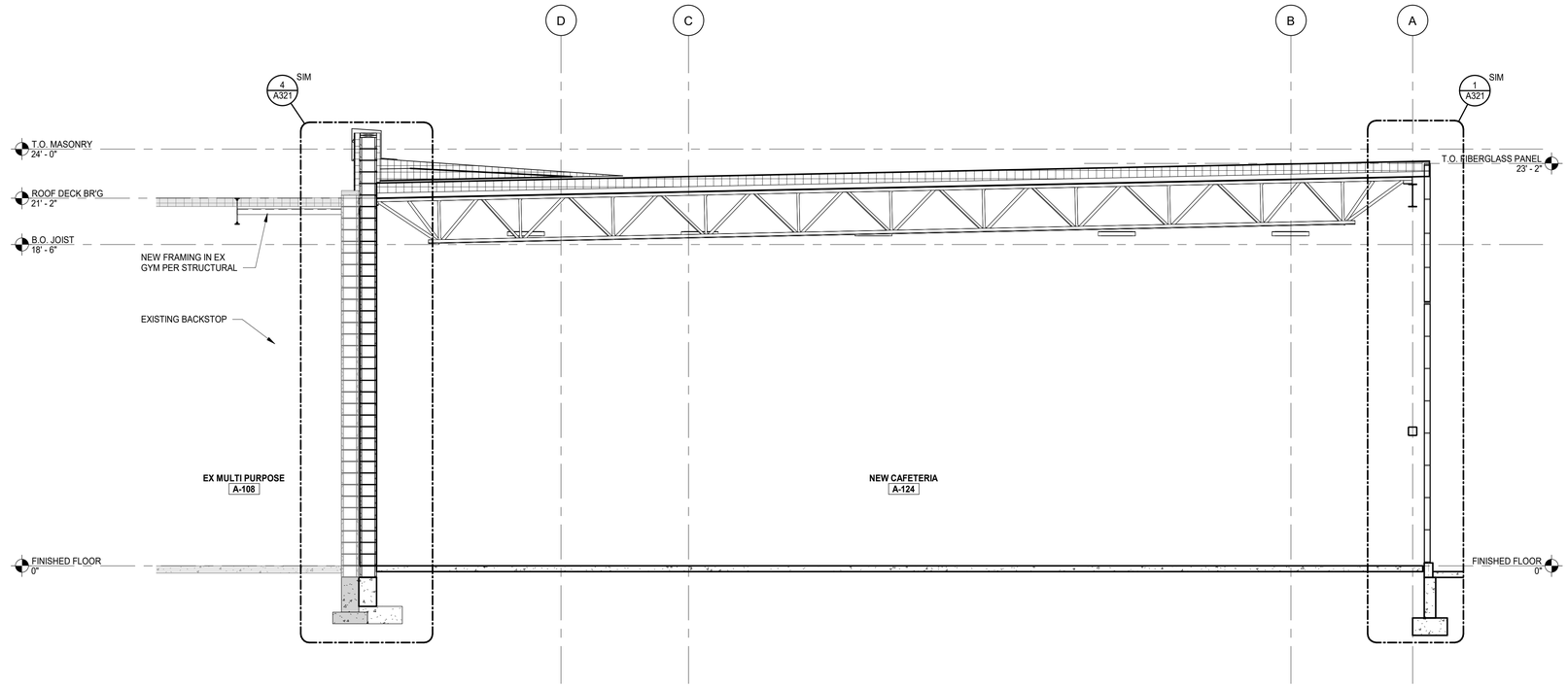
A201

9/21/2023 11:58:05 AM

ARCH D 24x36



2 NEW LONGITUDINAL
SCALE : 1/4" = 1'-0"



1 CUT THRU EX AND NEW
SCALE : 1/4" = 1'-0"

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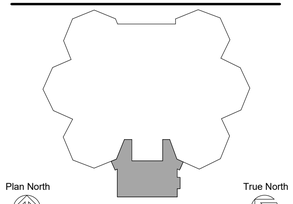
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D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

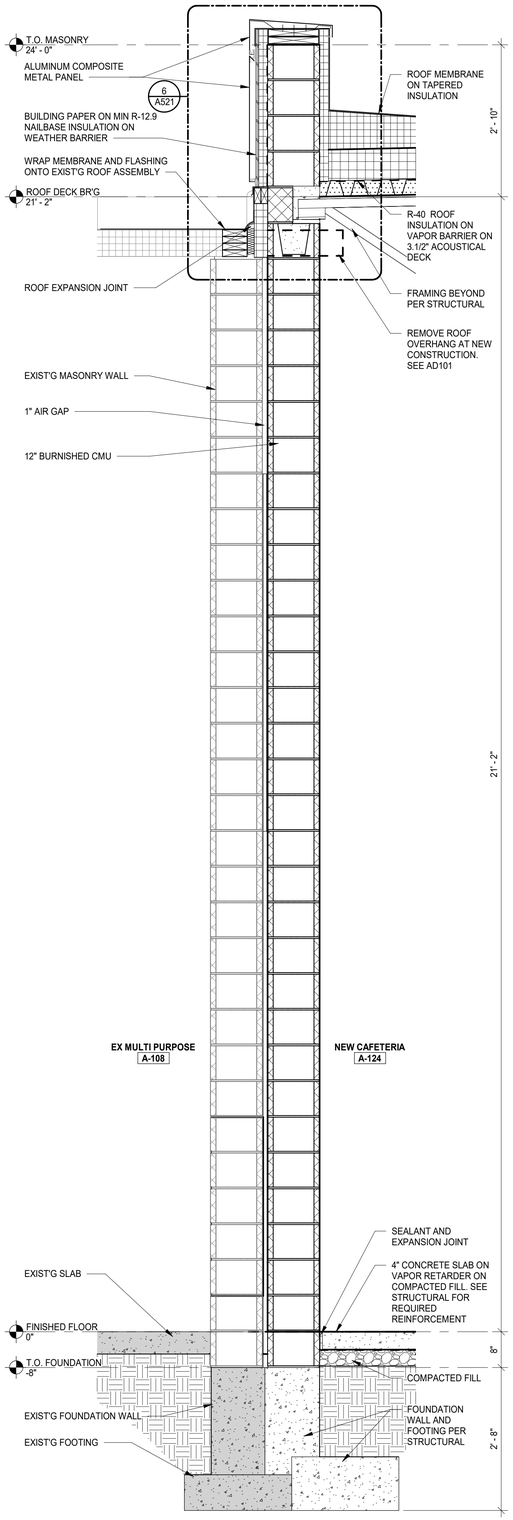
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BUILDING SECTIONS

Drawing Number

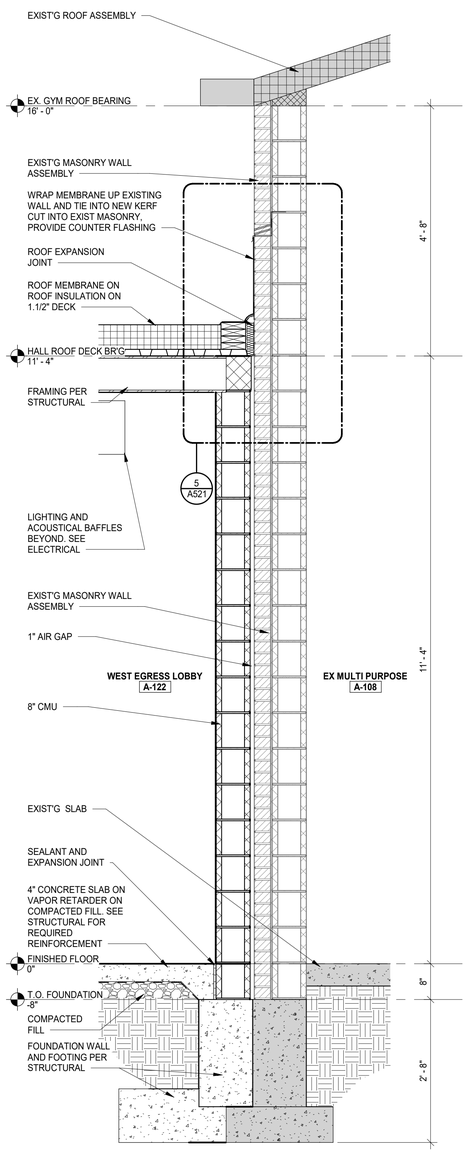
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ARCH D 24x36



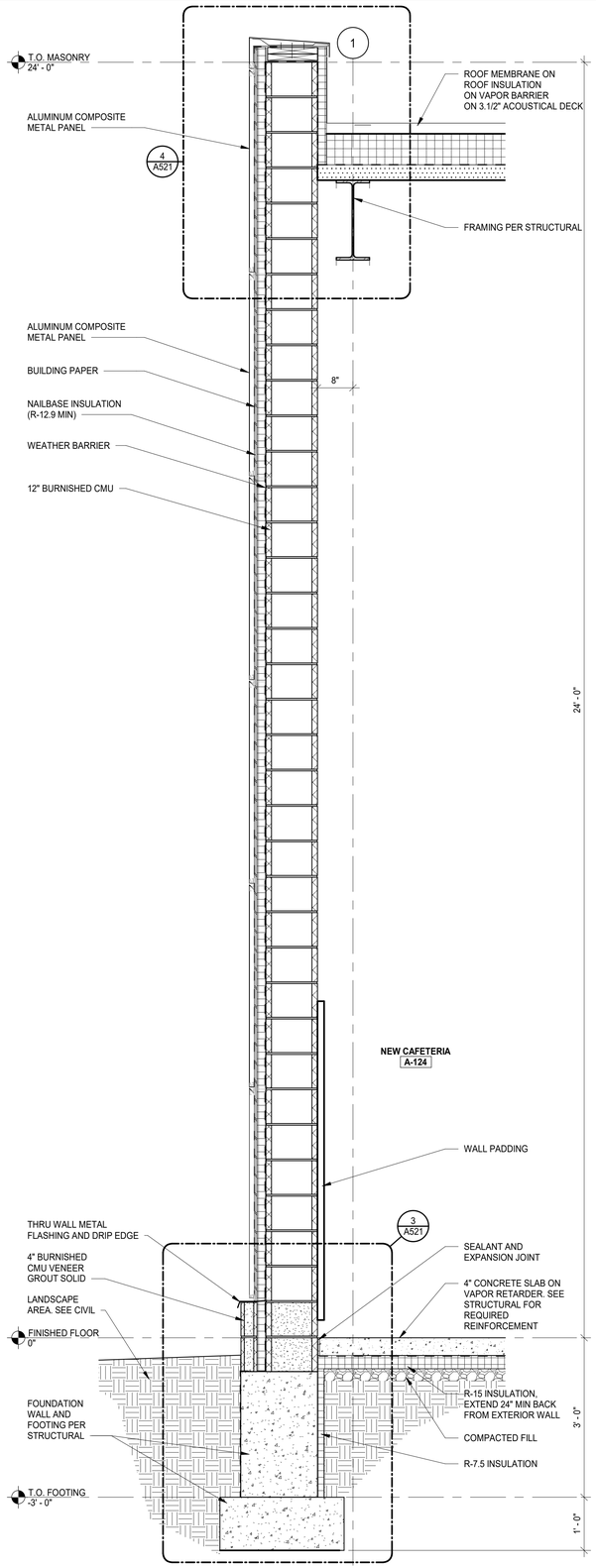
4 HIGHBAY @ EX GYM

SCALE : 3/4" = 1'-0"



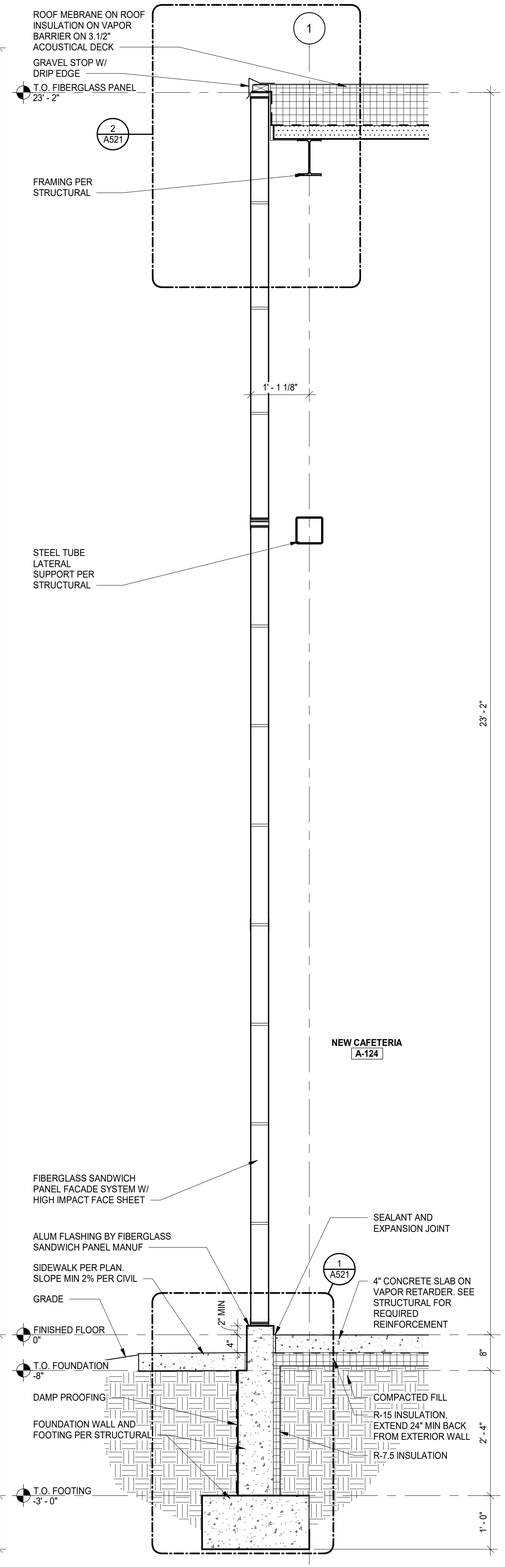
3 TYP WALL @ EX GYM

SCALE : 3/4" = 1'-0"



2 METAL PANEL ON CMU

SCALE : 3/4" = 1'-0"



1 TYP FIBERGLASS PANEL

SCALE : 3/4" = 1'-0"

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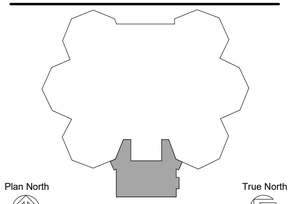
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D EBERT	B HUYLER
Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
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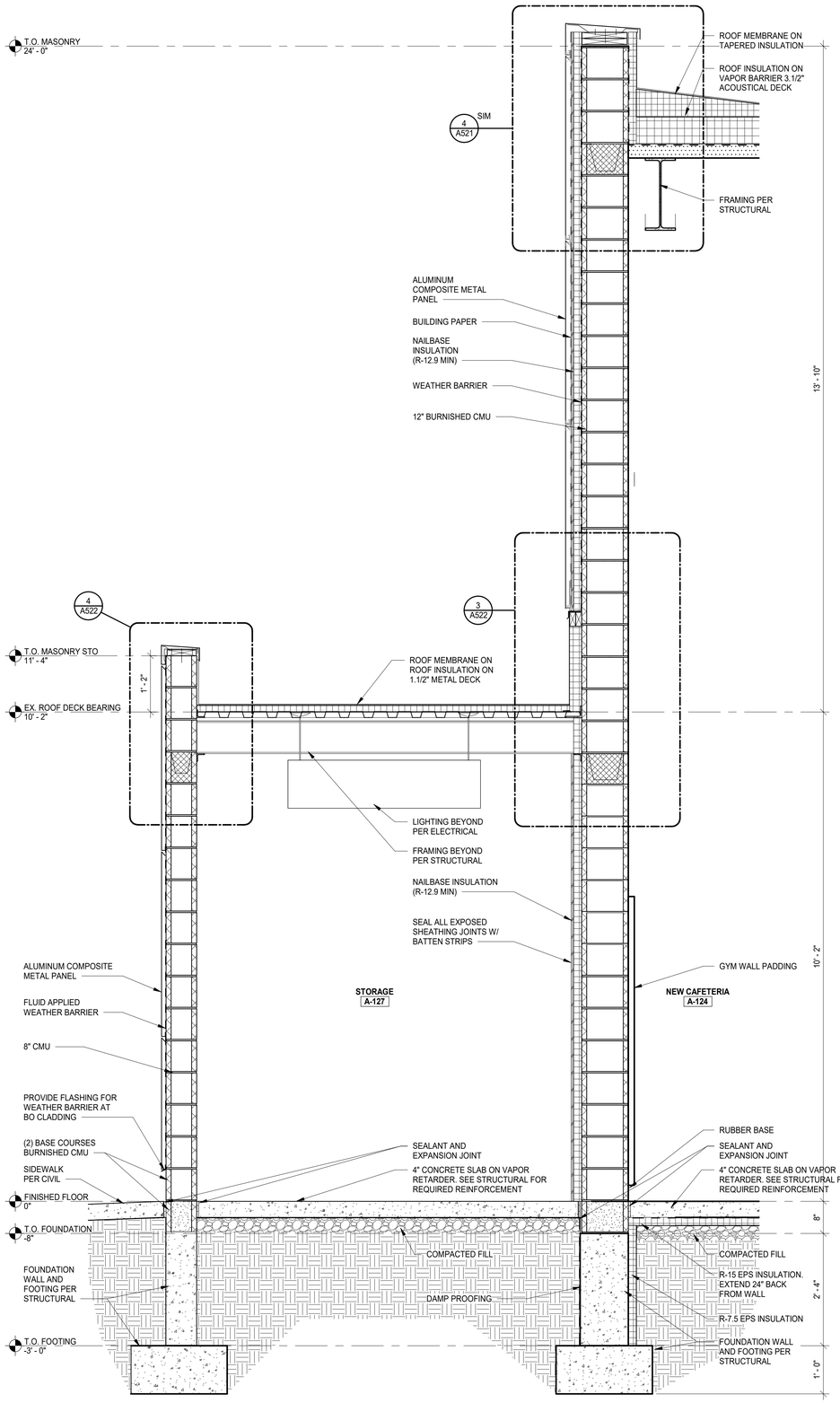
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WALL SECTIONS

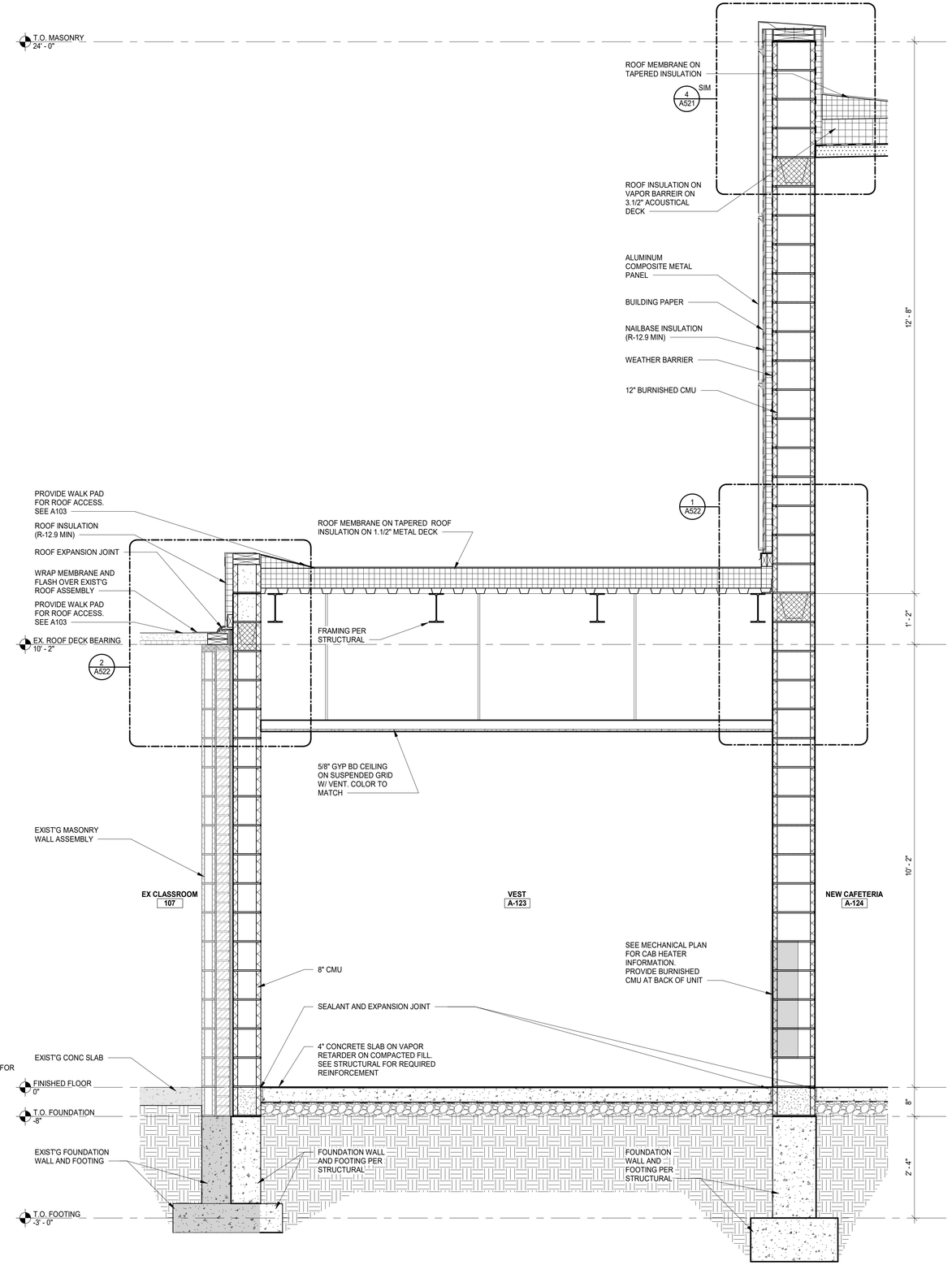
Drawing Number

A321

ARCH D 24x36



3 STORAGE A-127
SCALE : 3/4" = 1'-0"



1 VESTIBULE SECTION - NORTH/SOUTH
SCALE : 3/4" = 1'-0"

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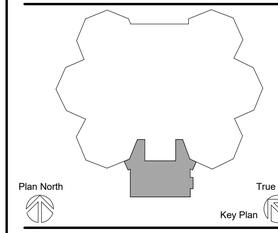
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Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
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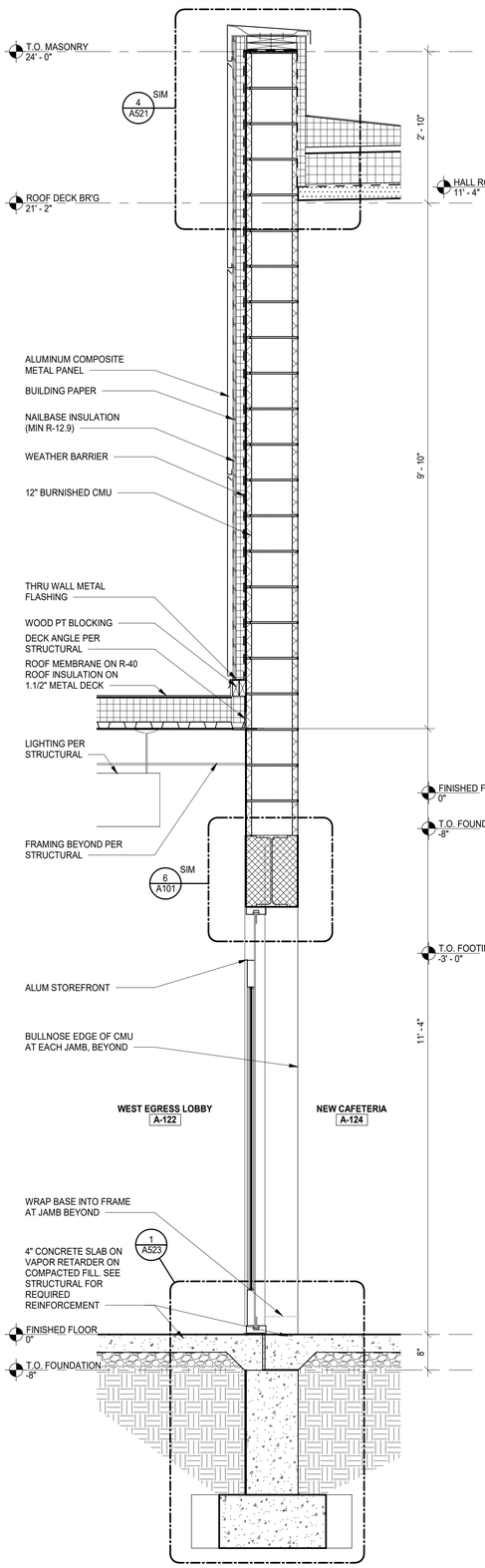
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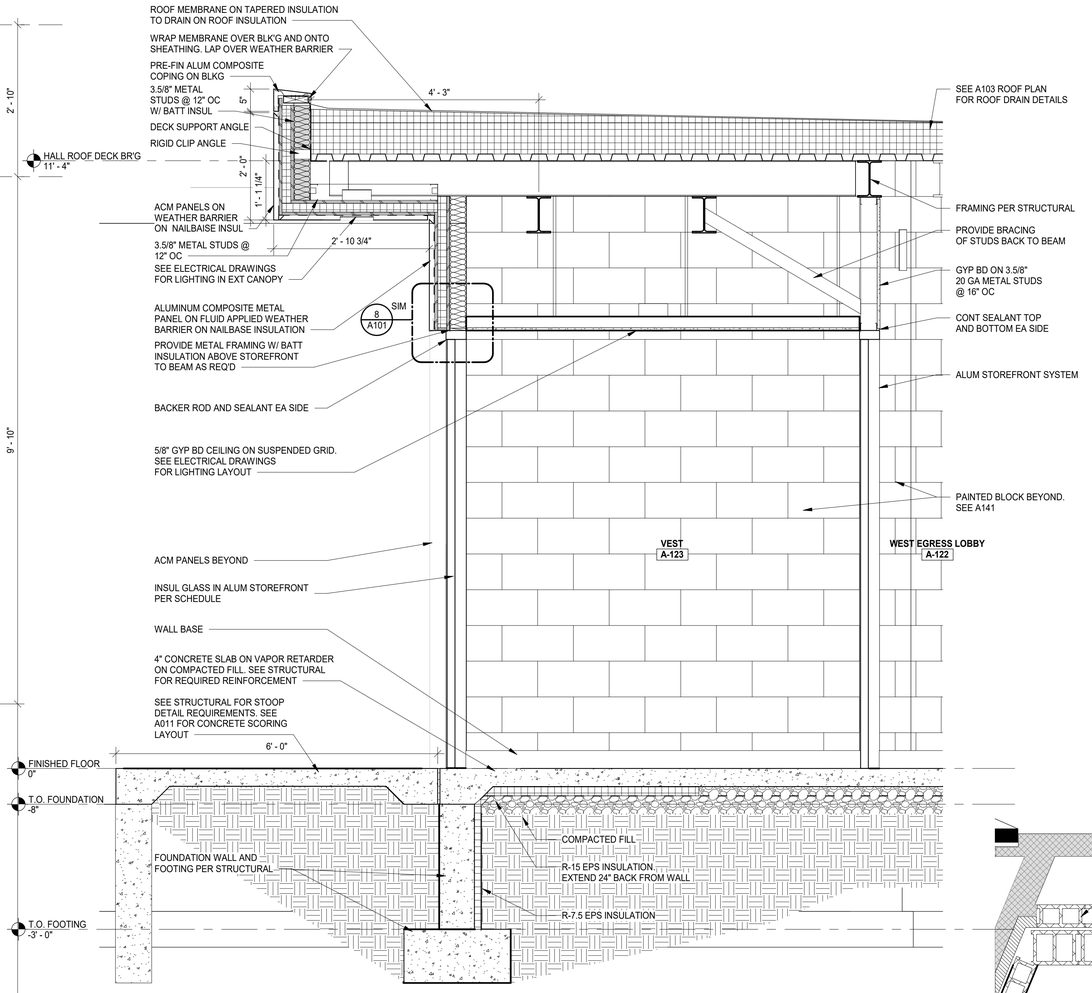
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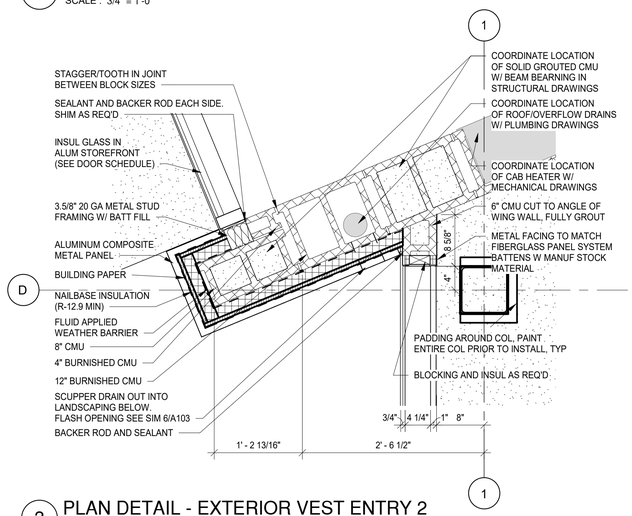
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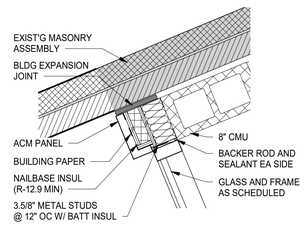
4 NEW CAF STOREFRONT
SCALE : 3/4" = 1'-0"



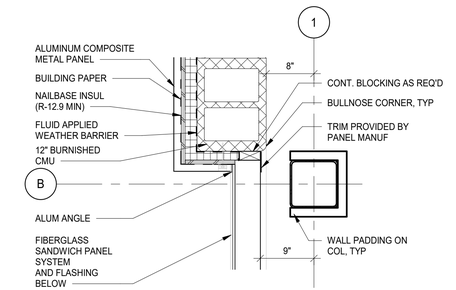
6 VESTIBULE SECTION - EAST/WEST
SCALE : 3/4" = 1'-0"



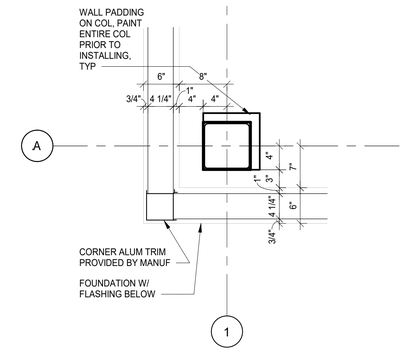
3 PLAN DETAIL - EXTERIOR VEST ENTRY 2
SCALE : 1" = 1'-0"



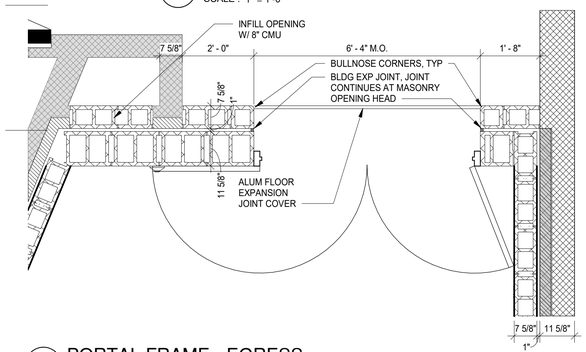
2 PLAN DETAIL - EXTERIOR VEST ENTRY
SCALE : 1" = 1'-0"



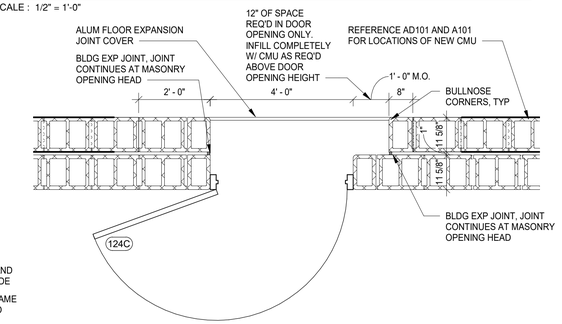
7 PLAN DETAIL - FIBERGLASS PANEL @ CMU
SCALE : 1" = 1'-0"



8 PLAN DETAIL - FIBERGLASS PANEL CORNER
SCALE : 1" = 1'-0"



5 PORTAL FRAME - EGRESS
SCALE : 1/2" = 1'-0"



1 PORTAL FRAME - B/W GYMS
SCALE : 1/2" = 1'-0"

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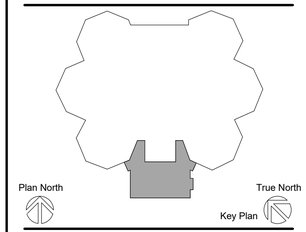
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SO-1790

915 ATTWOOD DR
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Designer	Reviewer
E POST	R KEUNEKE
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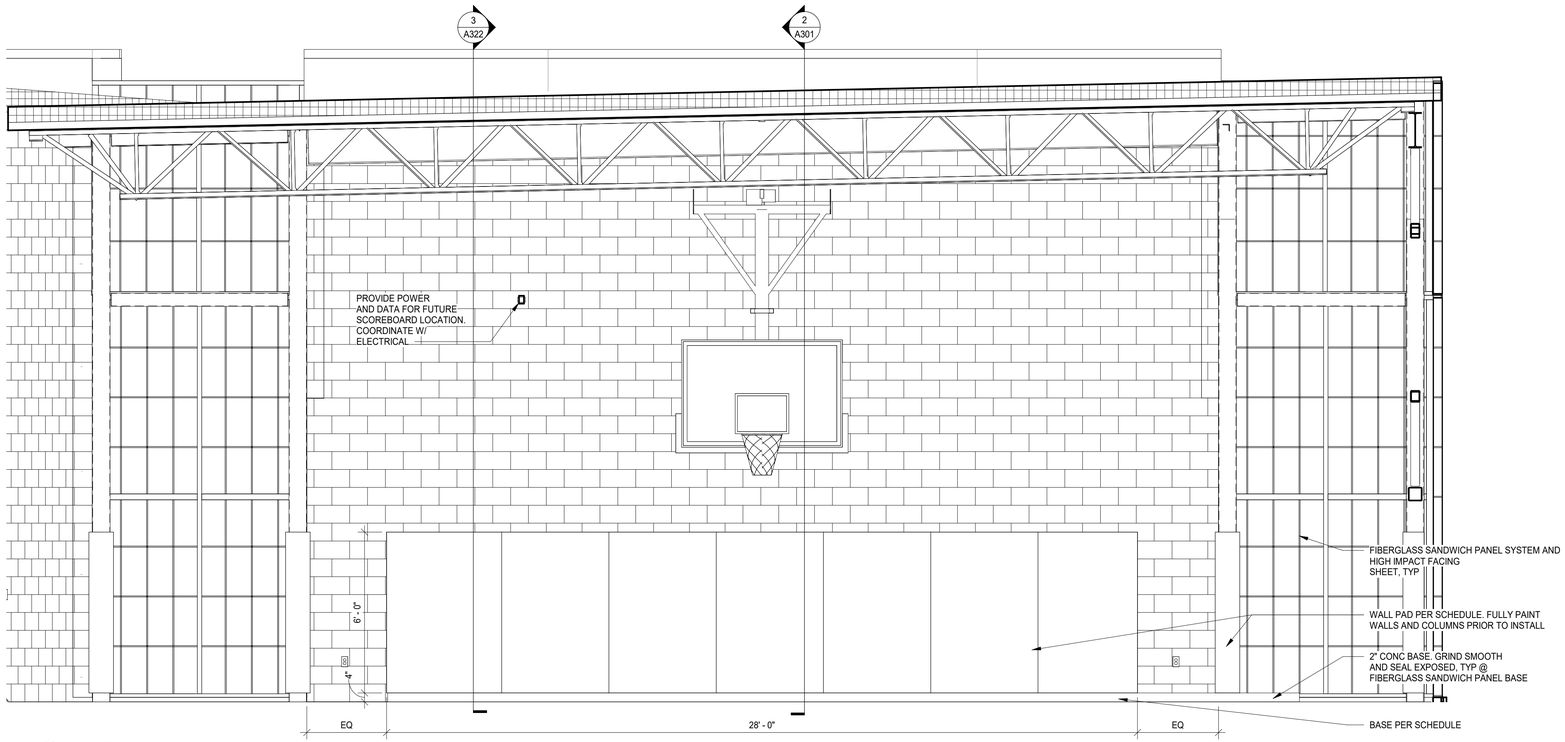
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SECTIONS AND PLAN DETAILS

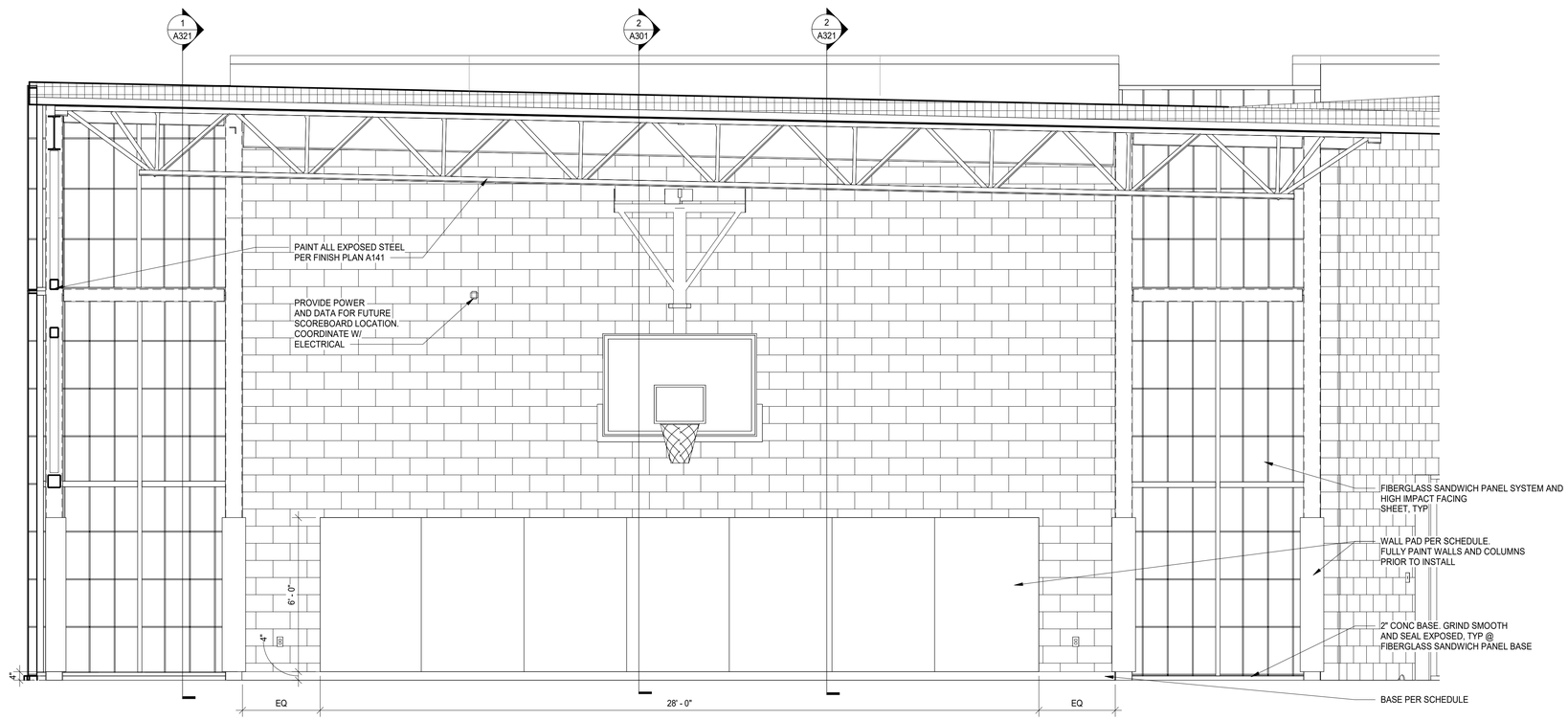
Drawing Number

A323

ARCH D 24x36



2 EAST WALL
SCALE : 3/8" = 1'-0"



1 WEST WALL
SCALE : 3/8" = 1'-0"

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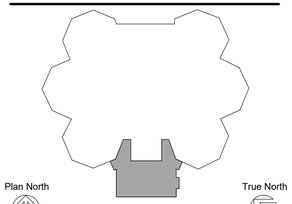
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Designer	Reviewer
J BOWRON	E POST
Date Issued	Project Number
9/18/2023	23005898A

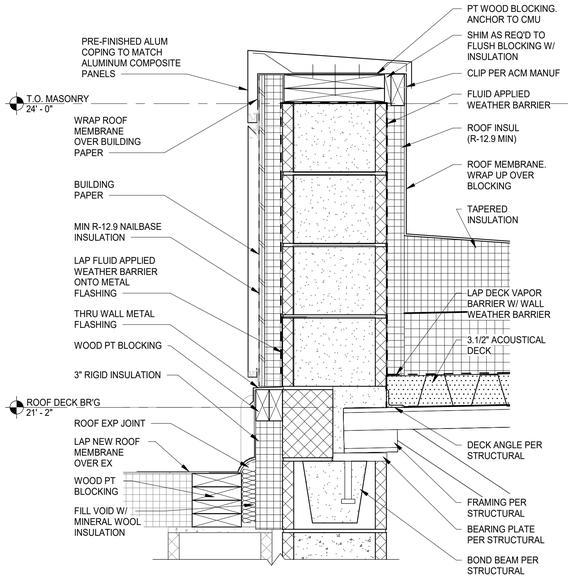
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INTERIOR ELEVATIONS

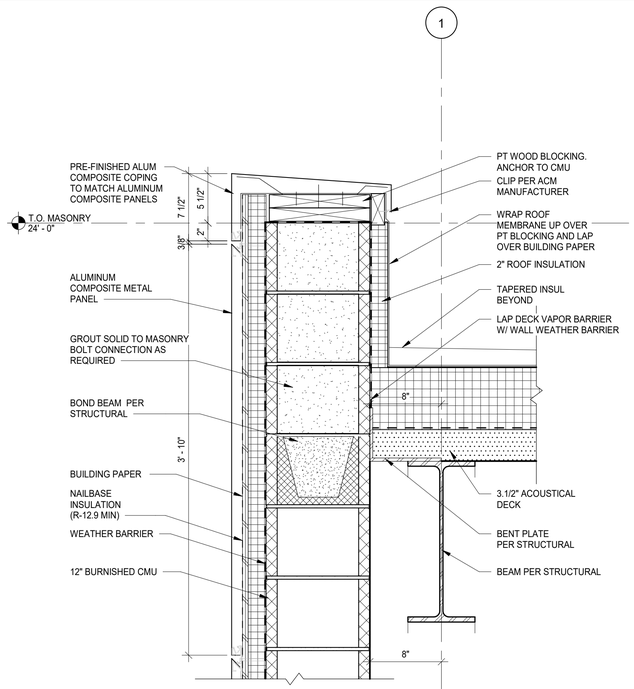
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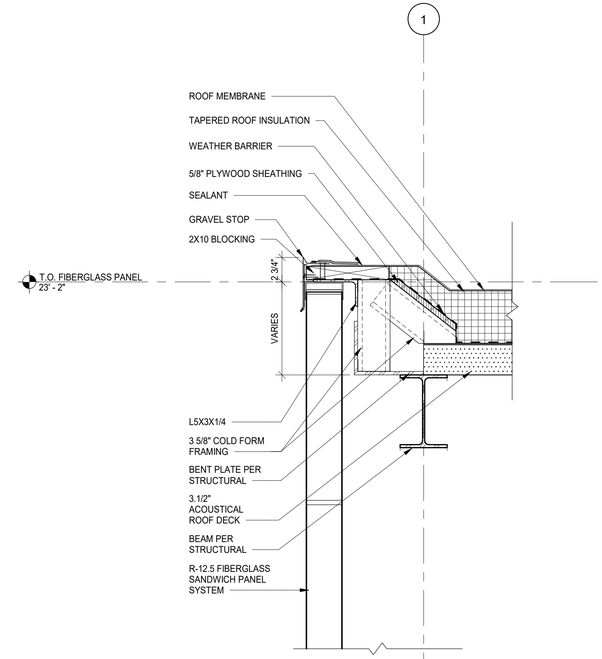
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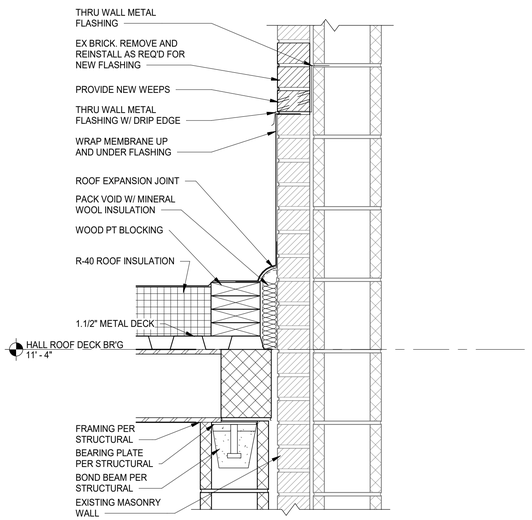
6 TOW - HIGHBAY @ EX
SCALE : 1 1/2" = 1'-0"



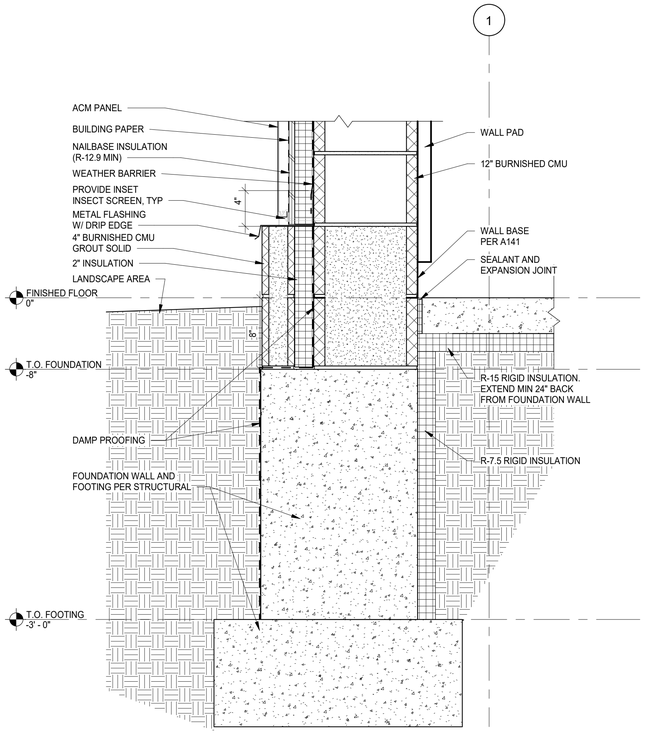
4 TOW - METAL PANEL ON CMU
SCALE : 1 1/2" = 1'-0"



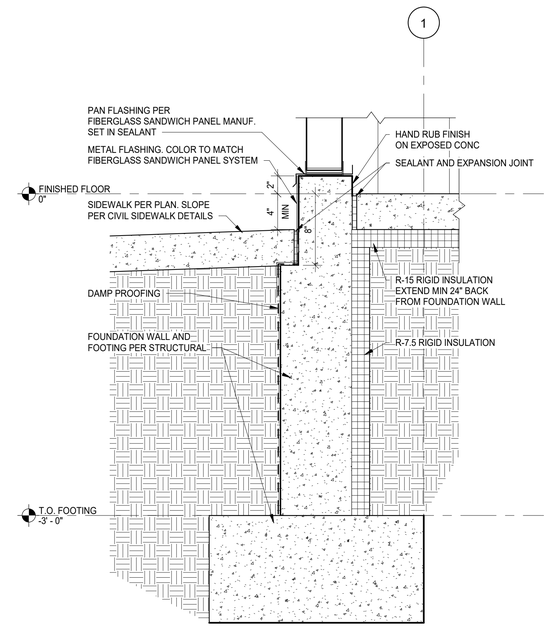
2 TOW - FIBERGLASS PANEL
SCALE : 1 1/2" = 1'-0"



5 TOW - EX GYM WALL
SCALE : 1 1/2" = 1'-0"



3 BOW - METAL PANEL ON CMU
SCALE : 1 1/2" = 1'-0"



1 BOW - FIBERGLASS PANEL
SCALE : 1 1/2" = 1'-0"

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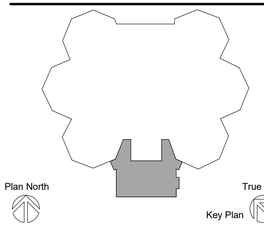
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
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Date Revised	Description
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Project Manager	Discipline Lead
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Designer	Reviewer
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Date Issued	Project Number
9/18/2023	23005898A

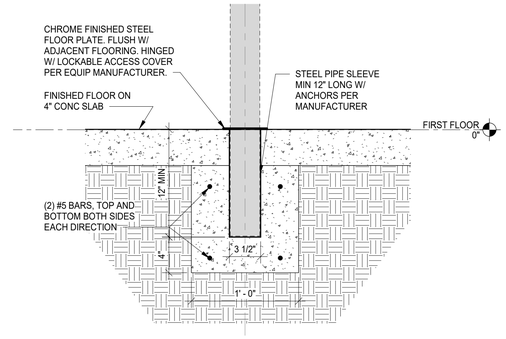
Sheet Name

SECTION DETAILS

Drawing Number

A521

ARCH D 24x36



5 VOLLEYBALL SLEEVE DETAIL REFERENCE MANUFACTURER INSTALL REQUIREMENTS
SCALE : 1 1/2" = 1'-0"

4 TOW - STO EXT
SCALE : 1 1/2" = 1'-0"

3 MID - STO INT
SCALE : 1 1/2" = 1'-0"

2 TOW - VEST/CLASSROOM
SCALE : 1 1/2" = 1'-0"

1 MID - VEST/CAF
SCALE : 1 1/2" = 1'-0"

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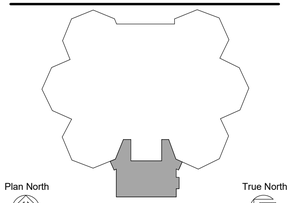
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Project Manager	Discipline Lead
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Designer	Reviewer
E POST	R KEUNEKE
Date Issued	Project Number
9/18/2023	23005898A

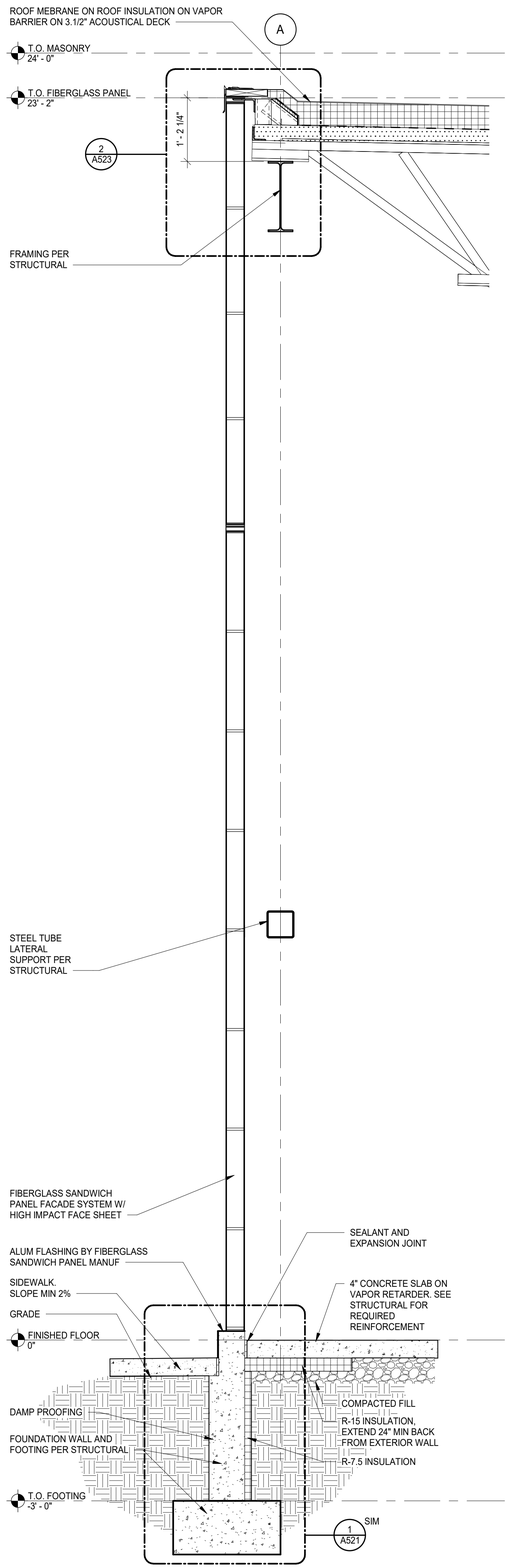
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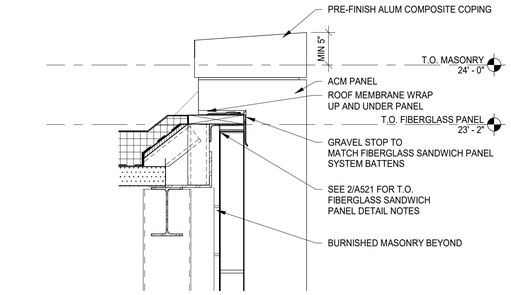
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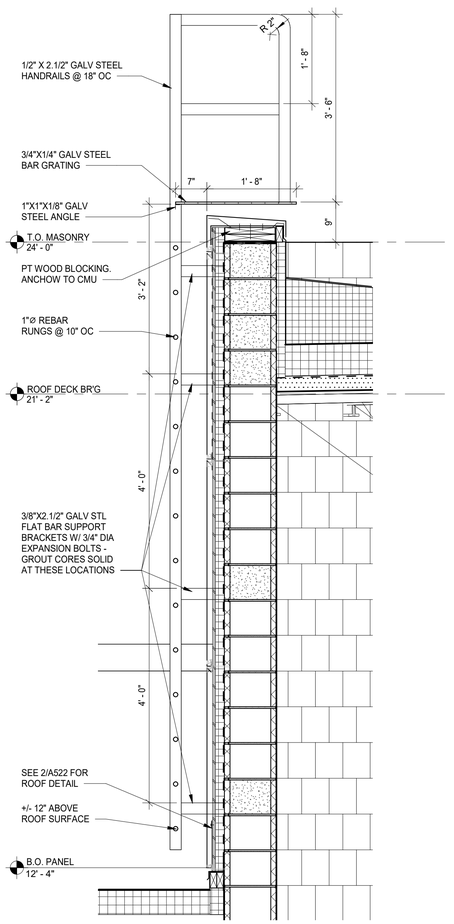
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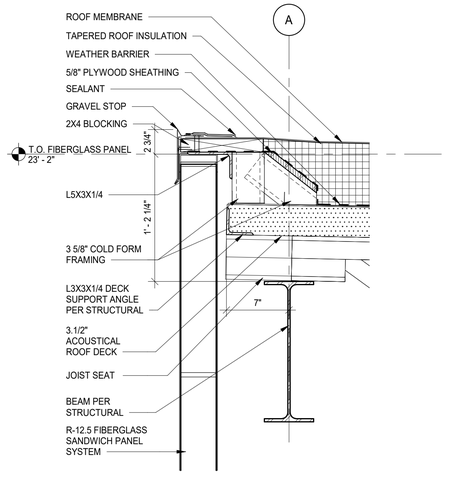
5 FIBERGLASS PANEL @ SOUTH WALL
SCALE : 3/4" = 1'-0"



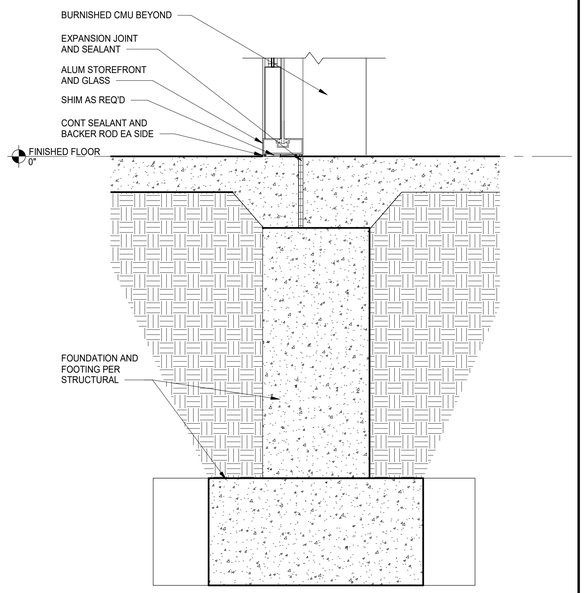
4 METAL PANEL EL @ GRAVEL STOP
SCALE : 1" = 1'-0"



3 ROOF ACCESS LADDER
SCALE : 3/4" = 1'-0"



2 TOW - FIBERGLASS PANEL @ SOUTH WALL
SCALE : 1 1/2" = 1'-0"



1 BOW - NEW CAF STOREFRONT
SCALE : 1 1/2" = 1'-0"

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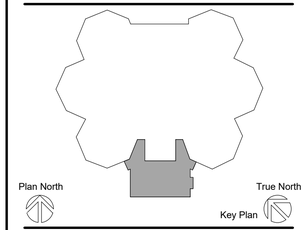
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Date Issued	Project Number
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Sheet Name

SECTION DETAILS

Drawing Number

A523

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CONTROL SEQUENCES

GENERAL TEMPERATURE CONTROLS SCOPE NOTES:

1. MECHANICAL CONTRACTOR SHALL INCLUDE TEMPERATURE CONTROLS WORK SCOPE AS SUB-CONTRACT TO THEIR WORK SCOPE.
2. TEMPERATURE CONTROL CONTRACTOR (TCC) SHALL INTEGRATE NEW SYSTEMS, EQUIPMENT AND DEVICES TO EXISTING BUILDING MANAGEMENT & CONTROL SYSTEM (BMCS)
3. TCC SHALL PROVIDE ALL REQUIRED LOW VOLTAGE WIRING, CONDUIT, COMMUNICATION WIRING, SENSORS, CONTROLLERS AND DEVICES FOR ALL MECHANICAL SYSTEMS TO RESULT IN A FULLY FUNCTIONING SYSTEM MEETING THE OPERATIONAL REQUIREMENTS OF THESE CONSTRUCTION PLANS
4. TCC SHALL ATTEND CONTROL SYSTEM KICK-OFF MEETING WITH OWNER AND ENGINEER (VIRTUAL MEETING) TO REVIEW CONTROL SYSTEM SCOPE AND DISCUSS DETAILED REQUIREMENTS FOR SYSTEMS PART OF THEIR SCOPE OF WORK; CONTROL SYSTEM KICK OFF MEETING SHALL BE SCHEDULED BY GENERAL CONTRACTOR APPROXIMATELY 2 WEEKS AFTER CONTROLS SUBMITTALS ARE REVIEWED AND RETURNED.
5. TCC SHALL INCLUDE START-UP AND COMMISSIONING OF THEIR CONTROL SYSTEM, NEW GRAPHICAL USER INTERFACE (GUI) TO BE ACCESSED THROUGH INTERNET CONNECTION VIA OWNER COMPUTER AND LOCAL AREA NETWORK, OWNER TRAINING (MINIMUM ONE 4-HOUR SESSION), AND DOCUMENTATION OF CONTROL SYSTEM FOR INCLUSION WITH O&M MANUALS,

PACKAGED ROOFTOP HVAC UNIT (RTU-1)

1. PACKAGED ROOFTOP UNIT TO BE PROVIDED WITHOUT CONTROLS; TCC TO PROVIDE CONTROLLER, SPACE TEMP & RH SENSOR, OUTSIDE AIR TEMP AND RH SENSOR, AND DISCHARGE TEMP SENSOR TO ACHIEVE THE FOLLOWING CONTROL SEQUENCE:
2. OCCUPIED MODE: BMCS SHALL SCHEDULE UNIT OCCUPIED AND UNOCCUPIED PERIODS. CONTROLS SHALL OPERATE UNIT AS SINGLE ZONE SYSTEM WITH CO2 BASED DEMAND CONTROLLED VENTILATION (OCCUPIED DCV MODE). RUN FAN CONTINUOUSLY DURING OCCUPIED PERIODS WITH UNIT OUTSIDE AIR DAMPER SET AT MINIMUM VENTILATION POSITION. CYCLE UNIT BETWEEN HEATING AND COOLING AS REQUIRED TO MAINTAIN ROOM HEATING AND COOLING SETPOINTS (68F HEATING – ADJ; 73F COOLING – ADJ). PROVIDE MINIMUM 3F DEADBAND BETWEEN HEATING AND COOLING SETPOINTS.
3. OCCUPIED DCV MODE: PROVIDE CO2 SENSOR IN NEW CAFETERIA NEXT TO MAIN RETURN AIR GRILLE. RUN FAN CONTINUOUSLY DURING OCCUPIED PERIODS; MODULATE UNIT OUTSIDE AIR DAMPER BETWEEN MINIMUM POSITION AND 50% OPEN TO MAINTAIN ROOM CO2 LEVELS AT 900 PPM (ADJ). CYCLE UNIT BETWEEN HEATING AND COOLING AS REQUIRED TO MAINTAIN ROOM HEATING AND COOLING SETPOINTS (68F HEATING – ADJ; 73F COOLING – ADJ). PROVIDE MINIMUM 3F DEADBAND BETWEEN HEATING AND COOLING SETPOINTS.
4. OCCUPIED ECONOMIZER COOLING MODE: PROVIDE OUTDOOR TEMP AND RH SENSOR. CONTROL SHALL COMPARE OUTDOOR ENTHALPY AND SPACE ENTHALPY, AND SHALL ALLOW AIRSIDE ECONOMIZER COOLING OPERATION WHEN OUTDOOR ENTHALPY IS LESS THAN INDOOR ENTHALPY (COMPARATIVE ENTHALPY ECONOMIZER CONTROLS) AND ZONE IS CALLING FOR COOLING. MODULATE UNIT OUTSIDE AIR DAMPER BETWEEN MINIMUM POSITION AND 100% OPEN TO MAINTAIN ZONE COOLING SETPOINT (73F COOLING – ADJ). CONTROL SHALL LOCK OUT MECHANICAL COOLING AND GAS HEATING WHEN SYSTEM IN OPERATING IN ECONOMIZER COOLING MODE.
5. UNOCCUPIED MODE: CONTROLS SHALL MAINTAIN UNIT FAN OFF AND CYCLE FAN ON WITH ACTIVELY HEATING OR COOLING DURING UNOCCUPIED MODE. CYCLE UNIT BETWEEN HEATING AND COOLING AS REQUIRED TO MAINTAIN ROOM HEATING AND COOLING NIGHT SETBACK SETPOINTS (60F HEATING – ADJ; 78F COOLING – ADJ).
6. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY MONITOR:
   A. SPACE TEMPERATURE (DEG. F)
   B. SPACE RELATIVE HUMIDITY (%RH)
   C. SPACE CO2 LEVEL (PPM)
   D. UNIT FAN OPERATION (ON/OFF)
   E. UNIT OPERATION (ACTIVE HEATING/ACTIVE COOLING)
   F. UNIT SUPPLY AIR TEMPERATURE (DEGREES F)
   G. UNIT OUTSIDE AIR DAMPER POSITION (% OPEN)
7. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY ADJUST:
   A. SPACE HEATING & COOLING TEMPERATURE SETPOINT (DEG. F)
   B. SPACE SETBACK HEATING & COOLING TEMP SETPOINT (DEG. F)
   C. SPACE CO2 SETPOINT (PPM)
   D. UNIT OCCUPANCY CONDITION (OCCUPIED/UNOCCUPIED)

EXISTING CAFETERIA HOT WATER CABINET UNIT HEATER CONTROLS (CUH-3 AND 4):

1. CABINET UNIT HEATER TO BE PROVIDED WITHOUT CONTROLS; TCC TO PROVIDE CONTROLLER, SPACE SENSOR, DISCHARGE TEMP SENSOR, FAN MOTOR CURRENT TRANSDUCER AND 2-WAY MODULATING CONTROL VALVE, TO ACHIEVE THE FOLLOWING CONTROL SEQUENCE:
2. OPERATIONAL MODE: BMCS SHALL SCHEDULE UNIT MODE OF OPERATION BASED ON ON TIME OF DAY SCHEDULE; SCHEDULE SHALL BE ADJUSTABLE THROUGH THE BMCS GRAPHICAL USER INTERFACE.
3. OCCUPIED MODE: CONTROLS SHALL CYCLE UNIT HEATER FAN AND MODULATE CONTROL VALVE ON CALL FOR HEAT AS REQUIRED TO MAINTAIN OCCUPIED HEATING SETPOINT (68F – ADJ)
4. UNOCCUPIED MODE: CONTROLS SHALL CYCLE UNIT HEATER FAN AND OPEN CONTROL VALVE TO FULL ON CALL FOR HEAT AS REQUIRED TO MAINTAIN UNOCCUPIED HEATING SETPOINT (55F – ADJ)
5. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY MONITOR:
   A. ZONE TEMPERATURE (DEG. F)
   B. UNIT FAN OPERATION (ON/OFF)
   C. CONTROL VALVE COMMAND POSITION (HEAT ON/OFF)
   D. UNIT SUPPLY AIR TEMPERATURE (DEGREES F)
6. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY ADJUST:
   A. SPACE HEATING TEMPERATURE SETPOINT (DEG. F)
   B. SPACE SETBACK HEATING TEMPERATURE SETPOINT (DEG. F)
   C. UNIT OCCUPANCY CONDITION (SUMMER/WINTER MODE)

VESTIBULE HOT WATER CABINET UNIT HEATER CONTROLS (CUH-1 AND 2):

1. CABINET UNIT HEATER TO BE PROVIDED WITHOUT CONTROLS; TCC TO PROVIDE CONTROLLER, SPACE SENSOR, DISCHARGE TEMP SENSOR, FAN MOTOR CURRENT TRANSDUCER AND 2-WAY, 2-POSITION CONTROL VALVE, TO ACHIEVE THE FOLLOWING CONTROL SEQUENCE:
2. OPERATIONAL MODE: BMCS SHALL SCHEDULE UNIT MODE OF OPERATION BASED ON ON OUTDOOR AMBIENT TEMPERATURE (OAT); CONTROLS WILL SCHEDULE UNIT TO OPERATE IN "SUMMER" MODE WHEN OAT IS ABOVE 50 DEG F (ADJ), AND SHALL SCHEDULE UNIT TO OPERATE IN "WINTER" MODE WHEN OAT IS 50 DEG F AND BELOW
3. WINTER MODE: CONTROLS SHALL CYCLE UNIT HEATER FAN AND OPEN CONTROL VALVE ON CALL FOR HEAT AS REQUIRED TO MAINTAIN WINTER HEATING SETPOINT (55F – ADJ)
4. SUMMER MODE: MAINTAIN UNIT FAN OFF AND CONTROL VALVE CLOSED
5. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY MONITOR:
   A. ZONE TEMPERATURE (DEG. F)
   B. UNIT FAN OPERATION (ON/OFF)
   C. CONTROL VALVE COMMAND POSITION (HEAT ON/OFF)
   D. UNIT SUPPLY AIR TEMPERATURE (DEGREES F)
6. BUILDING CONTROL SYSTEM SHALL BE ABLE TO REMOTELY ADJUST:
   A. SPACE HEATING TEMPERATURE SETPOINT (DEG. F)
   B. SPACE SETBACK HEATING TEMPERATURE SETPOINT (DEG. F)
   C. UNIT OCCUPANCY CONDITION (SUMMER/WINTER MODE)

MECHANICAL (DIVISION 23) SPECIFICATION:

GENERAL REQUIREMENTS

PROVIDE EQUIPMENT AND COMPONENTS INDICATED ON THE DRAWINGS, AND AS REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM. CONTRACTOR WILL BE RESPONSIBLE FOR RECEIVING, RIGGING AND INSTALLING ALL EQUIPMENT PROVIDED PART OF THEIR WORK CATEGORY.

DEFINITIONS: FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION. INSTALL MEANS TO PLACE IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE. PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE. RECEIVE MEANS TO COORDINATE AND ACCEPT DELIVERY OF EQUIPMENT AT JOBSITE.

MECHANICAL EQUIPMENT IDENTIFICATION: PROVIDE ENGRAVED PLASTIC LAMINATE LABEL FOR EACH MAJOR ITEM OF MECHANICAL EQUIPMENT & EACH OPERATIONAL DEVICE. LETTERS TO BE A MINIMUM OF ½" HIGH.

OPERATIONS AND MAINTENANCE MANUALS (O&M): AT COMPLETION OF PROJECT PROVIDE A MINIMUM OF TWO O&M MANUALS IN THREE RING BINDERS TO THE OWNER/TENANT. MANUALS SHALL HAVE TABS LABELED WITH ALL SECTIONS SEPARATED WITH A CLEAR INDEX AT THE FRONT. PROVIDE A WARRANTY LETTER AT THE FRONT OF THE MANUAL STATING DATES OF WARRANTY (START DATE AND END DATE) AND CONTRACTS WITH PHONE NUMBERS FOR WARRANTY WORK. PROVIDE A NARRATIVE OF HOW EACH SYSTEM IS INTENDED TO OPERATE INCLUDING RECOMMENDED SETPOINTS. MANUALS SHALL INCLUDE SUBMITTALS OF ALL EQUIPMENT, SIZE AND OPTIONS SELECTED. PROVIDE ALL BALANCING REPORTS. PROVIDE MANUFACTURER LITERATURE FOR OPERATIONS AND MAINTENANCE FOR ALL THE EQUIPMENT ON THE PROJECT. ALL PERIODIC AND ROUTINE MAINTENANCE SHALL BE CLEARLY IDENTIFIED. PROVIDE A CONTROLS SECTION LISTING SYSTEM OPERATING AND CONTROL INSTRUCTIONS, MAINTENANCE, CALIBRATION, WIRING DIAGRAMS, SCHEMATICS AND CONTROL SEQUENCE DESCRIPTIONS.

TESTING AND BALANCING: TEST AND ADJUST ALL MECHANICAL SYSTEMS AND EQUIPMENT TO ASSURE PROPER BALANCE AND OPERATION. PERFORM TESTS IN ACCORDANCE WITH THE MOST CURRENT NEBB OR AABC, AND ASHRAE STANDARDS. ELIMINATE OBJECTIONABLE NOISE AND VIBRATION, AND ASSURE PROPER FUNCTION OF CONTROLS. BALANCING CONTRACTOR SHALL BE AN INDEPENDENT CERTIFIED TEST AND BALANCE CONTRACTOR, WITH NEBB OR AABC CERTIFICATION. SUBMIT COMPLETED AND CERTIFIED TEST AND BALANCE REPORT TO OWNER'S REPRESENTATIVE. BALANCE ALL SYSTEMS TO WITHIN 5% OF AIR FLOWS AND WATER FLOWS INDICATED ON THE DRAWINGS.

TEMPERATURE CONTROLS REQUIREMENTS

TEMPERATURE CONTROLS FOR NEW HVAC SYSTEMS AND EQUIPMENT SHALL INTEGRATE TO THE EXISTING BUILDING MANAGEMENT AND CONTROL SYSTEM (BMCA) AND SHALL INCLUDE:

- INTEGATION TO EXISTING NETWORK AREA CONTROLLER (NAC) 'FRONT END' FIELD WIRED 2-WIRE COMMUNICATION NETWORK FOR DATA EXCHANGE BETWEEN THE NAC AND REMOTE UNITARY CONTROLLERS
- ALL REQUIRED UNITARY DDC CONTROLLERS WITH SUFFICIENT I/O CAPACITY TO SUPPORT SUPPORT REQUIREMENTS FR0OM CONTROL SEQUENCES
- ALL REQUIRED PROGRAMMING AND 'FRONT END' GRAPHICS
- ALL REQUIRED SENSORS/CONTROL VALVES/ CONTROL DAMPERS/CONTROL TRANSFORMERS/ RELAYS/CONTACTORS/ETC.
- SYSTEM START-UP AND COMMISSIONING
- OWNER TRAINING PLUS OWNER ASSISTANCE DURING THE FIRST YEAR OF OPERATION (INCLUDE UP TO 16 HOURS AND MINIMUM OF TWO VISITS FOR TRAINING AND ASSISTANCE).

REFER TO CONTROL SEQUENCES FOR OPERATIONAL REQUIREMENTS FOR ALL HVAC SYSTEMS TO BE CONTROLLED BY OR INTEGRATED TO THE BMCS.

GENERAL DUCT REQUIREMENTS

DUCT TURNING VANES: PROVIDE FABRICATED TURNING VANES AND VANE RUNNERS, CONSTRUCTED IN ACCORDANCE WITH SMACNA "HVAC DUCT CONSTRUCTION STANDARDS".AND MATCHING MATERIAL OF DUCT SYSTEM. PROVIDE TURNING VANES CONSTRUCTED OF CURVED BLADES, SUPPORTED WITH BARS PERPENDICULAR TO BLADES, AND SET INTO SIDE STRIPS SUITABLE FOR MOUNTING IN DUCTWORK. FOLLOW SMACNA GUIDELINES FOR SPACING, SUPPORT, AND CONSTRUCTION. ALL BLADES SHALL BE DOUBLE THICKNESS AIRFOIL TYPE.

DUCT INSULATION:
INDOOR: NO INSULATION REQUIRED FOR INDOOR EXPOSED DUCT IN CONDITIONED AREAS

OUTDOOR: PROVIDE INSULATION FOR ALL EXPOSED OUTDOOR SUPPLY & RETURN DUCTWORK. PROVIDE MINIMUM 12" THICK RIGID BOARD FIBERGLASS INSULATION, SECURED TO THE DUCT WITH WELD PINS AND ADHESIVE. INSTALLED R-VALUE SHALL BE 6.0 OR HIGHER. PROVIDE WEATHERPROOF CLADDING/JACKET FOR ALL SUPPLY & RETURN EXPOSED OUTDOOR DUCT BASED ON 3M VENTURECLAD 1577 CW SELF ADHESIVE ALUMINUM

ACOUSTIC LINING: PROVIDE 1" THICKNESS INTERNAL ACOUSTIC DUCT LINER (R3.5). INTERNAL DUCT LINER FOR ALL SUPPLY AND RETURN DUCTWORK WITHIN 25' OF CENTRAL AIR HANDLER OR TO FIRST ELBOW. ACOUSTIC LINING TO BE EQUAL TO JOHNS MANSVILLE LINACOUSTIC RC.

DUCT SEALANT: PROVIDE WATER BASED SYNTHETIC LATEX EMULSION PERMANENTLY FLEXIBLE HIGH VELOCITY DUCT SEALANT, DUCTM,ATE INDUSTRIES, INC. PRO SEAL OR EQUIVALENT. SEALANT TO BE LOW VOC LEED COMPLIANT CAPABLE OF 15" W.G., NFPA 90A AND 90B APPROVED, UL 181B-M LISTED AND UL 723 CLASSIFIED. INSTALL PER MANUFACTURER INSTRUCTIONS. SEALANT SHALL BE APPROVED FOR PLENUM INSTALLATIONS AND MEET FLAME SPREAD AND SMOKE DEVELOPMENT RATINGS FOR PLENUM APPLICATIONS.

SHEET METAL DUCT

SHEETMETAL DUCTWORK: PROVIDE SHEETMETAL DUCTWORK FABRICATED AND INSTALLED IN ACCORDANCE WITH ASHRAE AND SMACNA STANDARDS, FOR 2" W.G. PRESSURE CLASS, SEAL CLASS "A" (UNLESS OTHERWISE INDICATED ON DUCT SYSTEM SCHEDULE). SHEETMETAL SHALL BE GALVANIZED SHEET STEEL OF LOCK FORMING QUALITY, WITH G90 ZINC COATING. SHEET STEEL SHALL COMPLY WITH ASTM A653 STANDARD SPECIFICATION FOR STEEL SHEETMETAL, ALL ANGLE IRON USED FOR SUPPORT SHALL BE GALVANIZED. SEAL ALL DUCT SEAMS, TRANSVERSE AND LONGITUDINAL, AIR TIGHT. PROVIDE TURNING VANES AT ALL 90º ELBOWS.

RECTANGULAR VOLUME DAMPERS: PROVIDE MINIMUM 16 GAUGE GALV STEEL CHANNEL FRAME, 16 GAUGE GALVANIZED STEEL BLADES, MINIMUM ½" HEXAGONAL AXLE, MOLDED SYNTHETIC BEARINGS, WITH 3/8" SQUARE PLATED STEEL CONTROL SHAFT. LINKAGES SHALL BE CONCEALED IN THE FRAME. OPERATING SHAFT SHALL EXTEND BEYOND FRAME AND DUCT TO A LOCKING QUADRANT WITH ADJUSTABLE LEVER. MAXIMUM BLADE WIDTH SHALL NOT EXCEED 6".

ROUND VOLUME DAMPERS: PROVIDE ROUND MANUAL BALANCING DAMPER AT ALL RUN OUTS TO CEILING SUPPLY AIR DIFFUSERS. PROVIDE MINIMUM 20 GAUGE GALVANIZED STEEL FRAME AND BLADES, MINIMUM 3/8" SQUARE STEEL AXLE, MOLDED SYNTHETIC BEARINGS, WITH LOCKING POSITION REGULATOR. REGULATOR SHALL BE POSITIONED WITH SHEETMETAL BRACKET BEYOND DUCT COVERING. WHERE POSITIONING REGULATOR IS NOT ACCESSIBLE, PROVIDE COUPLING AND EXTENSION ROD WITH REGULATOR FOR CEILING OR WALL INSTALLATION, AS REQUIRED.

FLEXIBLE DUCT CONNECTORS: PROVIDE U.L. LABELED 30 OUNCE NEOPRENE COATED FIBERGLASS FABRIC DUCT CONNECTORS AT DUCT CONNECTIONS TO ALL VIBRATING EQUIPMENT.

PIPING REQUIREMENTS

NATURAL GAS PIPING:

NATURAL GAS PIPING: ALL NATURAL GAS PIPING SHALL BE SCH 40 STEEL PIPE, ASTM A53, WITH SCREWED JOINTS AND 150 LB MALLEABLE IRON FITTINGS FOR NPS 2" AND SMALLER, AND SCH 40 WELDED JOINTS AND FITTINGS FOR NPS 2-1/2" AND LARGER. PRESSURE TEST NEW GAS PIPE SYSTEMS TO 5 PSI FOR 30 MINUTES WITH NO LOSS OF PRESSURE BEFORE PLACING INTO SERVICE. LEAK TEST ALL GAS PIPE SCREWED JOINTS AND UNIONS BEFORE PLACING INTO SERVICE.

SHUTOFF/STOP VALVES: CWP RATED 125 PSIG BRONZE OR CAST IRON PLUG VALVE

APPLIANCE GAS VALES: CWP RATED 125 PSIG BRONZE OR CAST IRON PLUG VALVE.

APPLIANCE PRESSURE REGULATORS: CAST IRON OR DIE CAST ALUMINUM BODY, SPRING DIAPHRAGM TYPE, ANSI Z21.18, REFER TO PLANS FOR CAPACITY AND PRESSURE TURNDOWN REQUIREMENTS, STAINLESS STEEL VENT SCREEN, INSTALL IN ORIENTATION THAT PREVENTS WATER INTRUSION INTO VENT OPENING PER MFGR INSTRUCTIONS.

PIPE HANGERS: PROVIDE ADJUSTABLE CLEVIS STYLE PIPE HANGERS FOR NEW PIPING WITH 1/4" TREADED HANGER RODS FOR PIPE SIZES UP TO 1-1/4" NPS AND 3/8" THREADED HANGER RODS FOR PIPE SIZE ABOVE 1-1/4" NPS.

PIPE SUPPORT ON ROOF: PROVIDE DURABLOCK W/ GALVANIZED UNISTRUT AND RIGID UNISTRUT PIPE CLAMP (GALVANIZED) FOR SUPPORT OF GAS PIPING FROM ROOF

HYDRONIC HEATING WATER PIPING:
ABOVE GROUND HEATING WATER PIPING SHALL BE SCH 40 STEEL PIPE, ASTM A53, WITH SCREWED JOINTS AND 150 LB MALLEABLE IRON FITTINGS OR TYPE L COPPER TUBE WITH SWEAT JOINTS & FITTINGS FOR PIPE SIZES NPT 2" SMALLER, AND SCH 40 STEEL PIPE WITH MECHANICAL ROLL GOOVED JOINTS AND COUPLINGS FOR PIPE SIZES NPT 2-1/2" AND LARGER. UTILIZE RIGID COUPLINGS AT ALL HORIZONTAL MAIN RUNS AND VERTICAL RISERS; UTILIZE FLEXIBLE COUPLINGS AT ALL ELBOW CHANGES IN DIRECTION AND THE FIRST JOINT AFTER THE ELBOW, AND AT CONNECTIONS TO PUMPS AND COOLING TOWERS.

BELOW GROUND HEATING WATER PIPING (WOOD BOILER SUPPLY & RETURN) SHALL BE PEX-A FACTORY INSULATED AND JACKETED PIPE FOR DIRECT BURIAL, WIRSBO ECOFLEX THERMAL (OR EQUIVALENT)

MISCELLANEOUS:
TESTING AND BALANCING: PROVIDE THIRD PARTY TESTING & BALANCE OF ALL WATER AND AIR SYSTEMS. BALANCE SUPPLY AND RETURN AIR TERMINATIONS TO WITHIN +/- 10%, BALANCE EXHAUST AIR TERMINATIONS TO WITHIN +10% / -0%. BALANCE WATER TERMINALS TO +/- 10%. BALANCE AIR AND WATER SYSTEMS AT FULL CONNECTED SYSTEM FLOWS.

MECHANICAL EQUIPMENT IDENTIFICATION: PROVIDE LABEL FOR EACH MAJOR ITEM OF MECHANICAL EQUIPMENT & EACH OPERATIONAL DEVICE. LETTERS TO BE A MINIMUM OF ½" HIGH.

OPERATIONS AND MAINTENANCE MANUALS (O&M): AT COMPLETION OF PROJECT PROVIDE A MINIMUM OF TWO O&M MANUALS IN THREE RING BINDERS TO THE OWNER/TENANT. MANUALS SHALL HAVE TABS LABELED WITH ALL SECTIONS SEPARATED WITH A CLEAR INDEX AT THE FRONT. PROVIDE A WARRANTY LETTER AT THE FRONT OF THE MANUAL STATING DATES OF WARRANTY (START DATE AND END DATE) AND CONTRACTS WITH PHONE NUMBERS FOR WARRANTY WORK. MANUALS SHALL INCLUDE SUBMITTALS OF ALL EQUIPMENT, SIZE AND OPTIONS SELECTED. PROVIDE MANUFACTURER LITERATURE FOR OPERATIONS AND MAINTENANCE FOR ALL THE EQUIPMENT ON THE PROJECT. ALL PERIODIC AND ROUTINE MAINTENANCE SHALL BE CLEARLY IDENTIFIED.

GENERAL NOTES:

1. CONTRACTOR RESPONSIBLE FOR ALL REQUIRED PERMITS AND FEES RELATIVE TO THEIR WORK SCOPE.
2. COMPLETED INSTALLATIONS SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES AND ORDINANCES INCLUDING, BUT NOT LIMITED TO THE LATEST EDITIONS OF THE FOLLOWING: STATE BUILDING CODE, NFPA-90A, NFPA-96 AND NFPA-101.
3. CONTRACTOR REQUIRED TO ATTEND THE MANDATORY PRE-BID MEETING AT JOBSITE PRIOR TO BID AND VERIFY ALL PERTINENT EXISTING CONDITIONS.
4. HVAC CONTRACTOR TO PROVIDE COMPETE AIRSIDE AND WATER SIDE TEST & BALANCE OF ALL NEW HVAC SYSTEMS INCLUDING FURNACES, FANS, AND PUMPS. PROVIDE BALANCE REPORT TO ENGINEER FOR REVIEW.
5. CONTRACTOR RESPONSIBLE FOR CREATING WALL AND ROOF OPENINGS FOR ANY DUCT, PIPE OR CONDUIT PROVIDED AS PART OF THEIR WORK CATEGORY.
6. ALL WALL AND ROOF FLASHING & SEALING OF NEW FLUE PENETRATIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR; VERIFY MEANS OF FLASHING & SEALING WITH GENERAL CONTRACTOR PRIOR.
7. PROVIDE 1 YEAR WARRANTY ON WORKMANSHIP.

MECH CODE COMPLIANCE NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF SYSTEM IN COMPLIANCE WITH 2015 MICHIGAN MECHANICAL CODE (MMC), ASHRAE 90.1-2013, AND ALL OTHER APPLICABLE STATE AND LOCAL CODES.
2. AREA VENTILATION RATES HAVE BEEN CALCULATED TO MEET OR EXCEED THE REQUIREMENTS OF TABLE 403.3.1.1 OF 2015 MMC. SEE VENTILATION SCHEDULES FOR CALCULATIONS
3. EQUIPMENT SPECIFIED MEETS OR EXCEEDS THE MINIMUM PRESCRIPTIVE REQUIREMETNS OF THE MICHIGAN ENERGY CODE ASHRAE 90.1-2013.
4. CONTRACTOR SHALL PROVIDE CLOSE-OUT DOCUMENTS TO OWNER THAT INCLUDE TWO (2) SETS OF OPERATING, MAINTENANCE AND WARRANTY MANUALS.
5. ALL NEW NATURAL GAS PIPING HAS BEEN SIZED BASED ON THE BRANCH LENGTH METHOD OF 2015 INTERNATIONAL FUEL GAS CODE (IFGC); CONTRACTOR SHALL INSTALL GAS PIPING SYSTEM SHOWN IN ACCORDANCE WITH 2015 IFGC. (SEE PLANS)
6. NEW AIR HANDLING SYSTEMS (RTU-1) SERVING THE NEW CAFETERIA HAS A SUPPLY AIR CAPACITY GREATER THAN 2000 CFM; DUCT SMOKE DETECTOR SHALL BE REQUIRED IN BOTH THE SUPPLY DUCT UPSTREAM OF THE FIRST BRANCH OR AIR OUTLET (NFPA 90A) AND IN THE RETURN DUCT MAIN (2015 MMC 606.2.1).

HVAC PIPING LEGEND

BALANCING VALVE	DIRECTION OF FLOW
CHECK VALVE	PIPE FLEXIBLE CONNECTION
PIPE ELBOW	HTGS — HEATING SUPPLY
RISER UP	HTGR — HEATING RETURN
RISER DOWN	STRAINER
BRANCH UP	PRESSURE/TEMPERATURE PLUG
BRANCH DOWN	BALL VALVE
UNION	TWO WAY MOTORIZED
LIQUID IN GLASS THERMOMETER	CONNECTION OF NEW ONTO EXISTING

HVAC LEGEND

OR —	DUCTWORK
OR —	EXISTING DUCTWORK OR EQUIPMENT TO REMAIN
OR —	RECTANGULAR DUCTWORK SUPPLY AIR ELBOW DOWN
OR —	RECTANGULAR DUCTWORK SUPPLY AIR ELBOW UP
OR —	RECTANGULAR DUCTWORK RETURN AIR, EXHAUST AIR, OR OUTSIDE AIR ELBOW DOWN
OR —	RECTANGULAR DUCTWORK RETURN AIR, EXHAUST AIR, OR OUTSIDE AIR ELBOW UP
OR —	ROUND DUCTWORK ELBOW DOWN
OR —	ROUND DUCTWORK ELBOW UP
	BALANCE DAMPER
	EXHAUST/RETURN AIRFLOW ARROW
	SUPPLY AIRFLOW ARROW
T	SPACE TEMP SENSOR
(2)CD-1 8"ø 150 CFM	QUANTITY; AIR DEVICE TAG; NECK SIZE; AIR FLOW CFM — AIR DEVICE DESIGNATION
24x12	RECTANGULAR DUCT SIZE. FIRST NUMBER INDICATES SIZE FOR SIDE SHOWN.
24"ø	ROUND DUCT SIZE

HVAC ABBREVIATIONS

ACCU	AIR COOLED CONDENSING UNIT	HVAC	HEATING VENTILATING AND AIR CONDITIONING
AL	ACOUSTICALLY LINED		
APPROX	APPROXIMATE	HTGS	HOT WATER HEATING SUPPLY
ARCH	ARCHITECTURAL	HTGR	HOT WATER HEATING RETURN
CLG	CEILING	INSUL	INSULATION
CONC	CONCRETE	LAT	LEAVING AIR TEMPERATURE
CONN	CONNECTION	MC	MECHANICAL CONTRACTOR
COORD	COORDINATION	MECH	MECHANICAL
CP	CONDENSATE PUMP	MFG	MANUFACTURER
DB	DRY BULB	MMS	MANUAL MOTOR STARTER
DN	DOWN	NFDS	NONFUSED DISCONNECT SWITCH
DWG	DRAWING	OA	OUTSIDE AIR
EA	EACH	RA	RETURN AIR
EAT	ENTERING AIR TEMPERATURE	RM	ROOM
EC	ELECTRICAL CONTRACTOR	RTU	ROOF TOP UNIT
EQUIP	EQUIPMENT	SA	SUPPLY AIR
ESP	EXTERNAL STATIC PRESSURE	SHT	SHEET
EXIST	EXISTING	STOR	STORAGE
FDS	FUSED DISCONNECT SWITCH	TYP	TYPICAL
FF	FINISHED FLOOR	W/	WITH
FLEX	FLEXIBLE	W/O	WITHOUT
FLR	FLOOR	WB	WET BULB
FPM	FEET PER MINUTE		
GALV	GALVANIZED		

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Lansing School District

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LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & CONSTRUCTION

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Project Manager	Discipline Lead
NAME	CJN
Designer	Reviewer
CJN	
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

MECHANICAL GENERAL INFORMATION

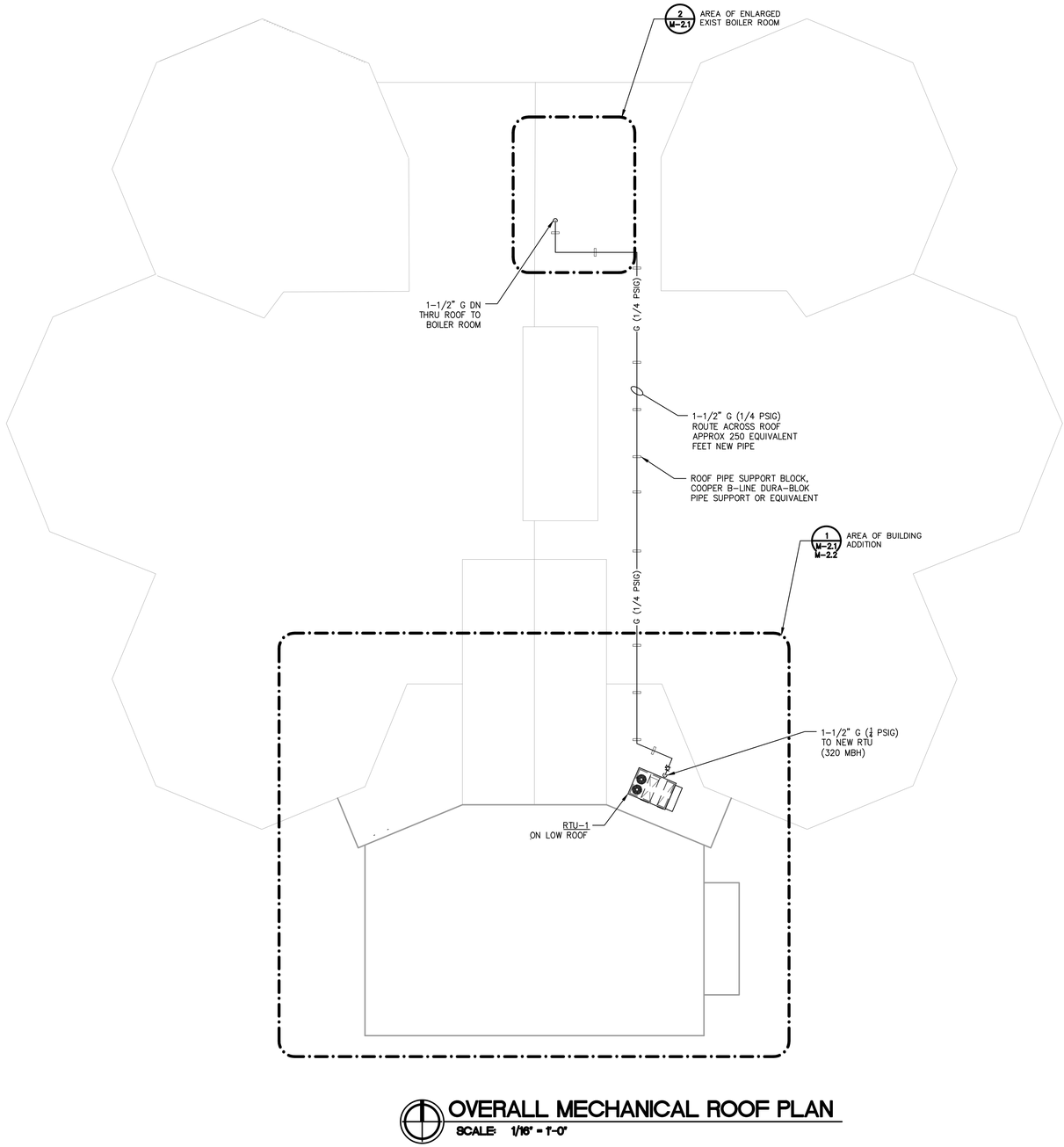
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OVERALL MECHANICAL ROOF PLAN

SCALE: 1/16" = 1'-0"

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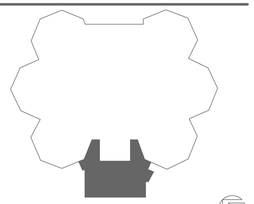
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OVERALL MECHANICAL ROOF PLAN

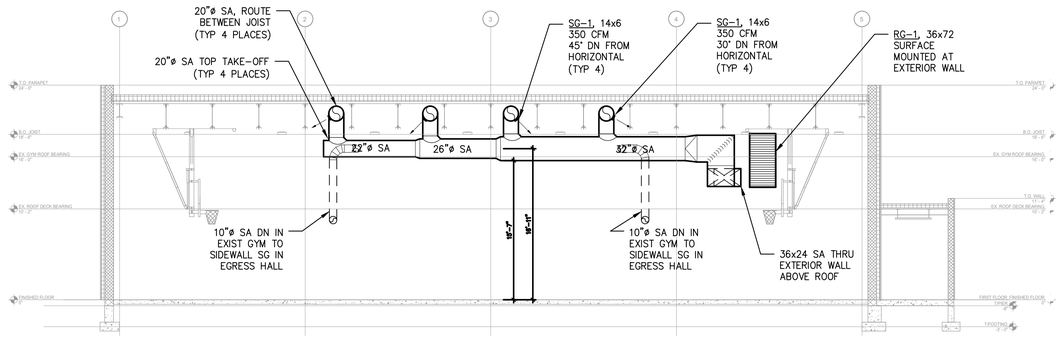
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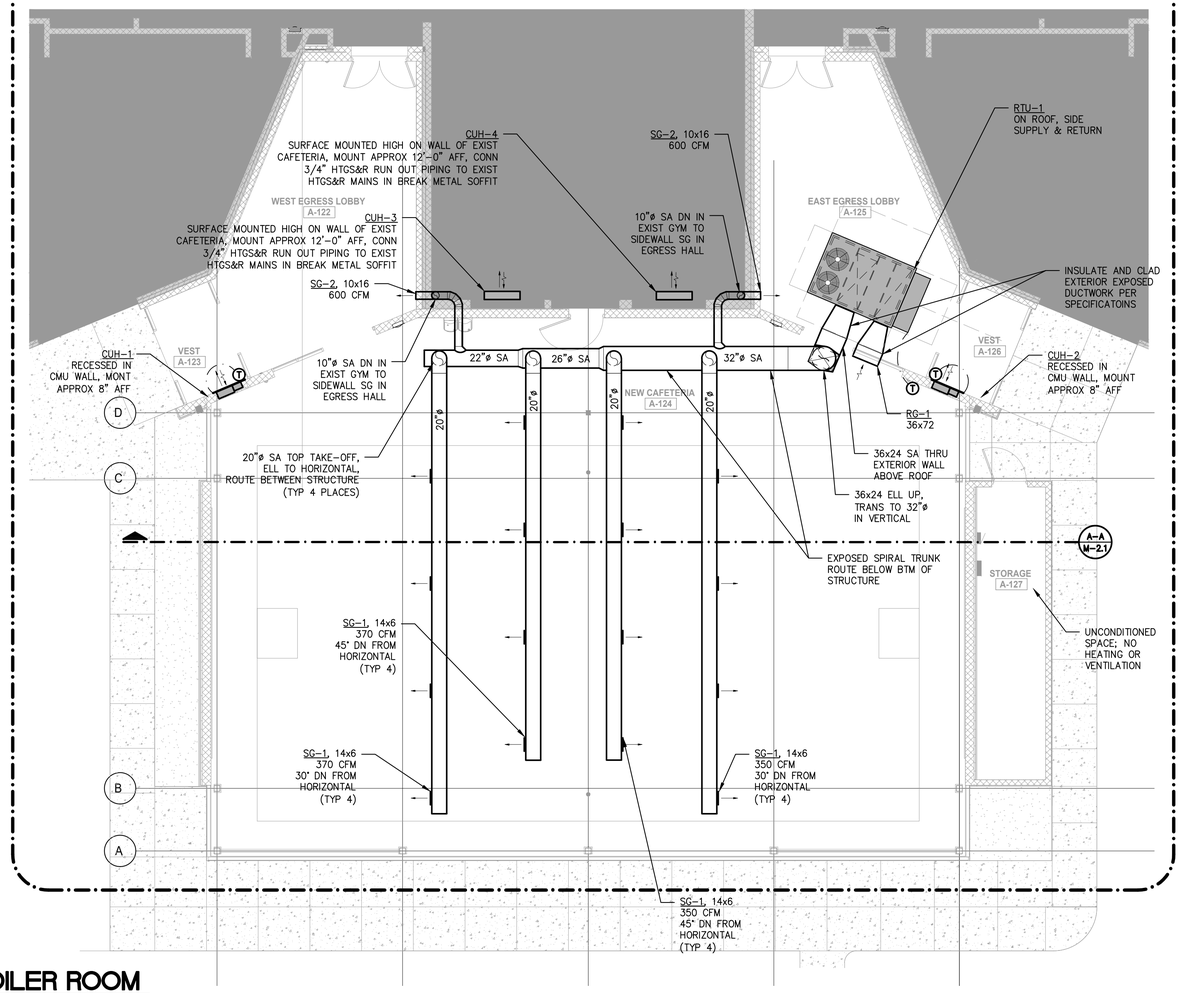
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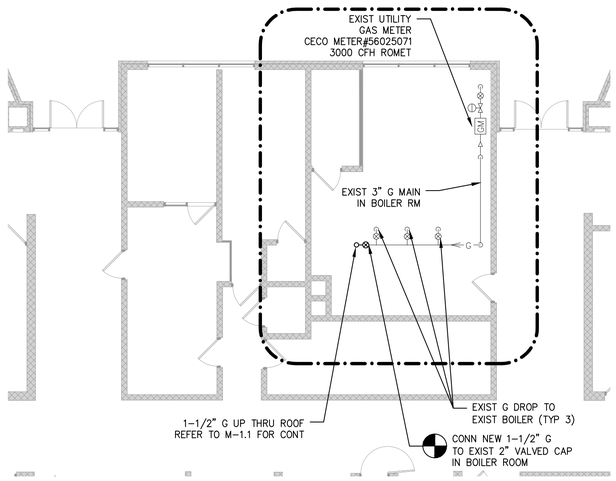
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A-A / M-2.1 **MECHANICAL SECTION**
SCALE: 1/8" = 1'-0"





2 / M-1.1 **ENLARGED MECHANICAL PLAN - EXISTING BOILER ROOM**
SCALE: 1/8" = 1'-0"

1 / M-1.1 **ENLARGED MECHANICAL PLAN - ADDITION**
SCALE: 1/8" = 1'-0"

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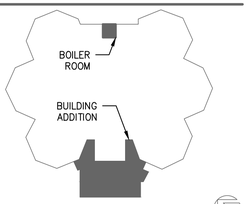
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ENLARGED MECHANICAL PLANS

Drawing Number

M201

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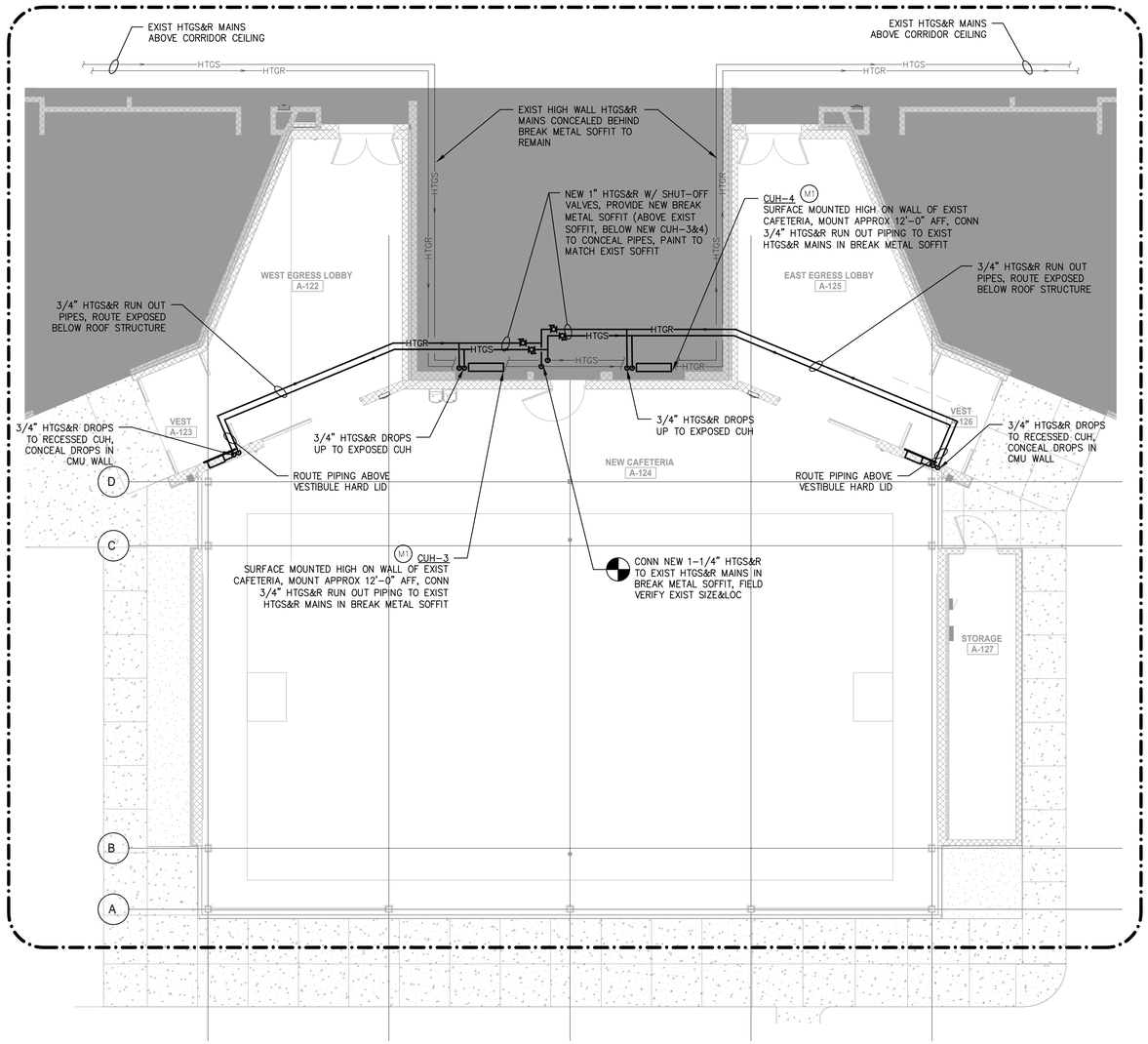
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KEYED MECHANICAL SCOPE NOTES:

(M1) DISCONNECT HTGS&R RUN-OUT PIPING TO EXISTING RECESSED CABINET HEATER IN EXTERIOR WALL FOR REMOVAL



1 / M-1.1 ENLARGED MECHANICAL PLAN - ADDITION
SCALE: 1/8" = 1'-0"

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ENLARGED HYDRONIC PLAN

Drawing Number

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CABINET UNIT HEATER SCHEDULE

MARK	LOCATION	MODEL	MBH	COIL ROWS	GPM	PD FT H2O	EWT	LWT	CFM	RPM	UNIT DIMENSIONS					ELECTRICAL			CONTROLS		DISCONNECT		REMARKS
											PANEL LENGTH	CABINET LENGTH	CABINET HEIGHT	CABINET DEPTH	RECESS DEPTH	VOLT	MCA	MOCP	TYPE	BY	TYPE	BY	
CUH-1	WEST EGRESS HALL A-122	FFH0301LC0C20AG	18.8	2	1.5	5.5	180	150	313	NOTE 4	3'-11"	2'-4"	2'-2"	9.75"	9.75"	120V/1PH	3	15	TSTAT	DIV 23	NFDS	DIV 23	1, 2
CUH-2	EAST EGRESS HALL A-125	FFH0301LC0C20AG	18.8	2	1.5	5.5	180	150	313	NOTE 4	3'-11"	2'-4"	2'-2"	9.75"	9.75"	120V/1PH	3	15	TSTAT	DIV 23	NFDS	DIV 23	1, 2
CUH-3	EXIST CAFETERIA	FFM0601LC0C20AH	18.8	3	3.0	5.5	180	150	604	NOTE 4	N/A	4'-0"	2'-3"	10.625"	0	120V/1PH	4	15	TSTAT	DIV 23	NFDS	DIV 23	1, 3
CUH-4	EXIST CAFETERIA	FFM0601LC0C20AH	18.8	3	3.0	5.5	180	150	604	NOTE 4	N/A	4'-0"	2'-3"	10.625"	0	120V/1PH	4	15	TSTAT	DIV 23	NFDS	DIV 23	1, 3

1. BASED ON TRANE FORCE-FLO CABINET HEATER MODELS, 70 DEG F EAT
2. VERTICAL RECESSED CABINET (MODEL H), STAMPED SUPPLY & RETURN LOUVER, FACTORY NON-FUSED DISCONNECT, FACTORY RIGHT HAND PIPING PACKAGE W/ AUTOFLOW CBV AND EXTENDED END CABINET, 2-WAY/2-POS CONTROL VALVE (1.4 Cv)
3. INVERTED VERTICAL EXPOSED CABINET (MODEL M), STAMPED FRONT SUPPLY & RETURN LOUVER, FACTORY NON-FUSED DISCONNET, FACTORY RH PIPING PKGW/ AUTOFLOW CBV & EXTENDED END CAB, 2-WAY MODULATING CONTROL VALVE (1.4 Cv)
4. UNIT MOUNTED FAN SPEED SWITCH, WALL/REMOTE MOUNTED TEMPERATURE SENSOR

ROOF TOP UNIT SCHEDULE

MARK	LOCATION AND SERVICE	MODEL	SUPPLY FAN							FILTERS	COMPRESSOR			COOLING COIL								HEATING MODULE				EER @ ARI COND	IEER @ ARI COND	WEIGHT (LBS)	ELECTRICAL			CONTROLS		DISCONNECT		REMARKS
			DESIGN CFM	FRESH AIR MIN%	FRESH AIR CFM	ESP	RPM	FLA	HP		UNIT TONS	NO OF COMP	KW INPUT	TYPE	EDB (° F)	EWB (° F)	LDB (° F)	LWB (° F)	SQ FT COIL	FACE VELOCITY	SENS MBH	TOTAL MBH	FUEL	HEAT STAGES	MBH INPUT	MBH OUTPUT				VOLT	MCA	MOCP	TYPE	BY	TYPE	BY	
RTU-1	ROOF CAFETERIA	YSJ240	7200	NOTE 5	2250	2.25"	2538	29.5	10	2" MERV 13	20	2	17.97	R-410A	80	65.5	55.3	55.1	21.4	383.2	221.56	259.77	NG	2-STAGE	320/224	259/181	9.8	13	2605	208V/3PH	108	125	NOTE 2	DIV 23	NOTE 3	DIV 23	1, 4

1. BASED ON TRANE PRECEDENT PACKAGEDROOFTOP MODELS, STANDARD EFFICIENCY, DUAL MANIFOLD COMPRESSOR/4-STAGES COOLING, DUAL DIRECT DRIVE BC PLUG FAN, 90.1 FAN SPEED REDUCTION AT PART LOAD COOLING, 2-STAGE GAS HEAT, 0-100% ECONOMIZER, 2" FILTER RACK, 14" CURB, SIDE SUPPLY & RETURN
2. FACTORY bacNET MSTP COMMUNICATION GATEWAY FOR INTEGRATION WITH EXISTING BUILDING MANAGEMENT SYSTEM
3. FACTORY NFDS AND UN-POWERED 115 GFCI CONVENIENCE OUTLET
4. PROVIDE COMPLETE EXTRA/SPARE SET OF UNIT FILTERS
5. PROVIDE UNIT WITH LOOSE SHIPPED RETURN DUCT MOUNTED CO2 SENSOR AND FACTORY CONTROLS FOR CO2 BASED DEMAND CONTROLLED VENTILATION ; UNIT TO BE SET FOR 10% MIN OA RATE (30 STUDENTS/GYM CLASS ACTIVITY) AND WILL MODULATE OA DAMPER BETWEEN MIN AND 50% OPEN TO MAINTAIN SPACE CO2 LEVEL AT 900 PPM

DIFFUSER, REGISTER & GRILLE SCHEDULE

MARK	SERVICE	MODEL	VOLUME CONTROL DAMPER	FINISH	REMARKS
SG-1	SPRIAL DUCT MOUNT SUPPLY GRILLE	S300FS	AIR SCOOP	STANDARD WHITE	1. DOUBLE DEFLECTION SUPPLY GRILLE FRONT BLADES IN SHORT DIMENSION
SG-2	DOUBLE DEFLECTION SUPPLY GRILLE	300 RS	YES	STANDARD WHITE	1. DOUBLE DEFLECTION SUPPLY GRILLE FRONT BLADES IN SHORT DIMENSION
RG-1	LOUVERED RETURN GRILLE	350 RL	NO	STANDARD WHITE	1. SINGLE DEFLECTION RETURN GRILLE BLADES IN LONG DIMENSION

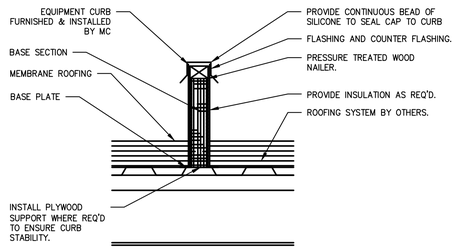
1. BASED ON TITUS MODELS (OR EQUAL BY PRICE, NAILOR)

DUCT SYSTEM SCHEDULE

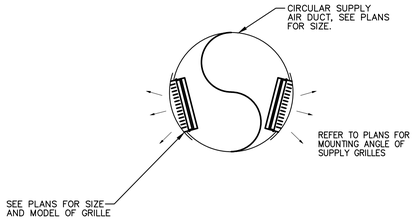
UNIT/ SYSTEM	DUCT SYSTEM	SMACNA PRESSURE & SEAL CLASSIFICATION				DUCT SYSTEM MATERIAL	EXTERNAL DUCT INSULATION					REMARKS
		PRESSURE CLASS (" WG)	POSITIVE	NEGATIVE	SEAL CLASS		RIGID BOARD	WRAP BLANKET	VAPOR BARRIER	THICKNESS (IN)	DENSITY (PCF)	
RTU-1	SUPPLY AIR EXPOSED - INDOOR	2"	X			G90 GALVANIZED						1, 3
RTU-1	RETURN AIR EXPOSED - INDOOR	2"		X		G90 GALVANIZED						1, 3
RTU-1	SUPPLY AIR EXPOSED - OUTDOOR	2"	X			G90 GALVANIZED	X		X	2"	3.00	1, 2, 4
RTU-1	RETURN AIR EXPOSED - OUTDOOR	2"		X		G90 GALVANIZED	X		X	2"	3.00	1, 2, 4

1. REFER TO MECHANICAL SPECIFICAITONS ON SHEET M001 FOR ADDITIONAL REQUIREMENTS
2. EXTERNAL DUCT CLADDING SYSTEM BASED ON 3M VENTURECLAD 1577CW FLEXIBLE SELF-ADHEREING ALUMINUM JACKETING SYSTEM
3. EXPOSED SUPPLY & RETURN DUCT IN CONDITIONED PARTS OF BUILDING DOES NOT REQUIRE ANY INSULATION
4. PROVIDE 1" THICKNESS OF INTERIOR ACOUTIC LINING FOR SUPPLY AND RETURN DUCT WITHIN FIRST 25 FT OF UNIT OR TO FIRST ELBOW; INTERNAL LINING DOES NOT REMOVE REQUIREMENT FOR EXTERNAL INSULATION FOR EXTERIOR DUCTWORK. DUCT SIZES LISTED ON PLANS REPRESENT FREE AREA; OVERSIZE DUCT AS REQUIRED TO ACCOMMODATE INTERNAL LINING

NOTE:
1. ROOF CURBS: SHALL BE EQUAL TO PATE MODEL PC-2B. PROVIDE FLASHING AND COUNTER FLASHING AS REQ'D.
2. REFER TO ARCHITECTURAL DRAWINGS FOR ROOF PLAN.



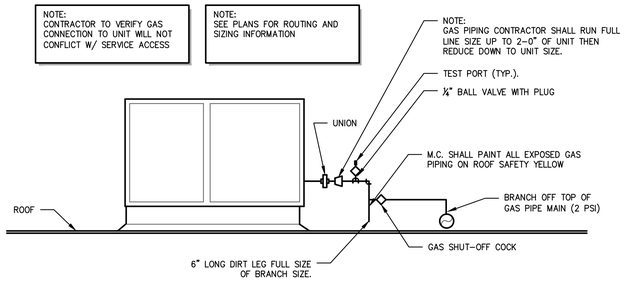
EQUIPMENT CURB DETAIL
NOT TO SCALE



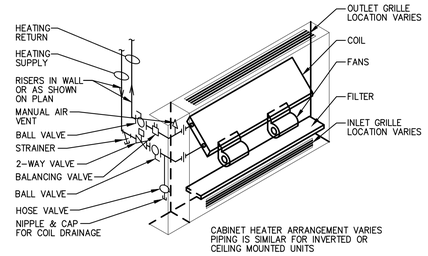
SPIRAL DUCT DIFFUSER DETAIL
NOT TO SCALE

NOTE: CONTRACTOR TO VERIFY GAS CONNECTION TO UNIT WILL NOT CONFLICT W/ SERVICE ACCESS

NOTE: SEE PLANS FOR ROUTING AND SIZING INFORMATION



UNIT GAS CONNECTION DETAIL
NOT TO SCALE



CABINET UNIT HEATER PIPING SCHEMATIC
NOT TO SCALE

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MECHANICAL SCHEDULES & DETAILS

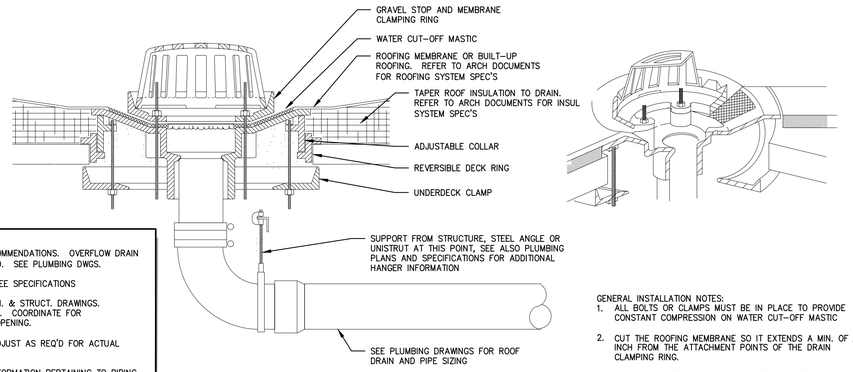
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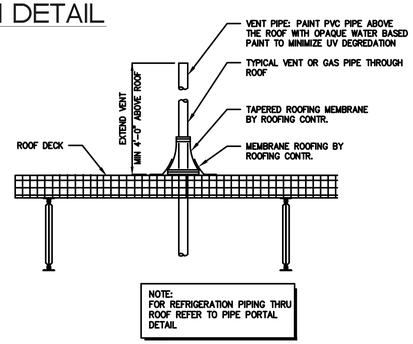
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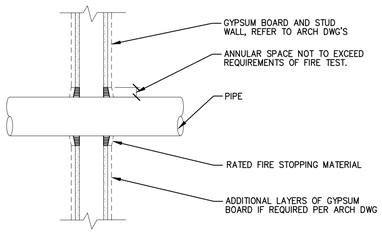
NOTES:
1. INSTALL ROOF DRAINS PER MFGR'S RECOMMENDATIONS. OVERFLOW DRAIN SAME SIZE AS ROOF DRAIN, WHEN REQ'D. SEE PLUMBING DWGS.
2. INSULATE DRAIN BODIES AND PIPING. SEE SPECIFICATIONS
3. LOCATE DRAINS WHERE SHOWN ON ARCH. & STRUCT. DRAWINGS. COORDINATE WITH ROOFING CONTRACTOR. COORDINATE FOR SUPPLEMENTARY STEEL AROUND ROOF OPENING.
4. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST AS REQ'D FOR ACTUAL CONDITIONS.
5. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION PERTAINING TO PIPING, INSULATION, HANGERS, AND ACCEPTED MFGRS.
6. REFER TO SPECIFICATIONS FOR ACCEPTED PIPING MATERIALS AND JOINING METHODS.

GENERAL INSTALLATION NOTES:
1. ALL BOLTS OR CLAMPS MUST BE IN PLACE TO PROVIDE CONSTANT COMPRESSION ON WATER CUT-OFF MASTIC
2. CUT THE ROOFING MEMBRANE SO IT EXTENDS A MIN. OF ½ INCH FROM THE ATTACHMENT POINTS OF THE DRAIN CLAMPING RING.
3. HOLE IN MEMBRANE MUST EXCEED SIZE OF DRAIN PIPE.

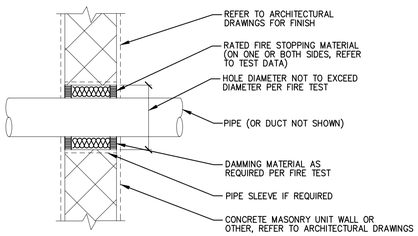
ROOF DRAIN DETAIL
NOT TO SCALE



TYPICAL PIPE THRU ROOF DETAIL
NOT TO SCALE



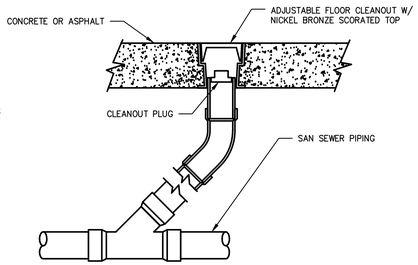
MECHANICAL FIRESTOPPING STUD WALL PENETRATIONS
NOT TO SCALE



MECHANICAL FIRESTOPPING WALL PENETRATIONS
NOT TO SCALE

1. INSTALL COMPLETE ASSEMBLY AS REQUIRED PER FIRESTOPPING FIRE TEST (SUBMIT TEST NUMBER PER SPECIFICATION SECTION 07841).
2. PROVIDE AT ALL FIRE RATED FLOORS. REFER TO ARCHITECTURAL DRAWINGS FOR FIRE RATING HOURS.
3. REFER TO SPECIFICATION SECTION 07841.
4. MULTIPLE PIPES CAN BE USED IF IN COMPLIANCE WITH FIRE TEST.
5. THESE ARE GENERIC DETAILS; OTHER FIRESTOPPING SYSTEMS CAN BE USED IF THEY ARE IN COMPLIANCE WITH FIRE TEST REQUIREMENTS.
6. IF FIRE TESTS ARE NOT AVAILABLE FOR T-RATINGS PROVIDE HIGHEST AVAILABLE T-RATING BUT NOT TO EXCEED F-RATING OF FIRE ASSEMBLY.

NOTE:
INSTALL FD'S & CO'S FLUSH W/ FLOOR



CLEANOUT DETAIL
NOT TO SCALE

PLUMBING ABBREVIATIONS

AAV	AIR ADMITTANCE VALVE
AFF	ABOVE FINISH FLOOR
AVTR	ACID VENT THROUGH ROOF
AV	ACID VENT
AW	ACID WASTE
BFP	BACKFLOW PREVENTER
BT	BATHTUB
CA	COMPRESSED AIR PIPING
CBV	CALIBRATED BALANCING VALVE
CLG	CEILING
CN	CONDUCTOR NOZZLE
CO	CLEANOUT
COND	CONDENSATE
CONN	CONNECTION
CONT	CONTINUATION
COORD	COORDINATE
CS	CLINIC SERVICE SINK
CW	DOMESTIC COLD WATER
CWFU	COLD WATER FIXTURE UNITS
DF	DRINKING FOUNTAIN
DFU	DRAINAGE FIXTURE UNITS
DN	DOWN
DW	DISHWASHER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
ECO	EXTERIOR CLEANOUT
ES	EMERGENCY SHOWER/EYEWASH
ET	EXPANSION TANK
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
FD	FLOOR DRAIN
FF	FINISH FLOOR
FH	FUME HOOD
FLR	FLOOR
FS	FLOOR SINK
FSET	FOOD SERVICE EQUIPMENT TRADES
G	NATURAL GAS
GT	GREASE TRAP
HB	HOSE BIBB
HSS	HOUSE STRUCTURAL STEEL
HW	DOMESTIC HOT WATER
HWFU	HOT WATER FIXTURE UNITS
HWR	DOMESTIC HOT WATER RETURN
HWRP	HOT WATER RECIRCULATION PUMP
IE	INVERT ELEVATION
IOB	ICEMAKER OUTLET BOX
LAV	LAVATORY
LOC	LOCATION
LS	LAB SINK
LT	LAUNDRY TUB
MFR	MANUFACTURER
MSB	MOP SERVICE BASIN
OC	ON CENTER
OD	OVERFLOW ROOF DRAIN
OI	OIL INTERCEPTOR
PSI	POUNDS PER SQUARE INCH
PVB	PRESSURE VACUUM BREAKER
PVW	PRIMER VALVE WATER
RD	ROOF DRAIN
RFCBV	RESTRICTED FLOW CALIBRATED BALANCING VALVE
RH	ROOF HYDRANT
RPZBFP	REDUCED PRESSURE ZONE BACKFLOW PREVENTER
SAN	SANITARY DRAIN
SCW	SOFTENED DOMESTIC COLD WATER
SH	SHOWER
SP	SUMP/SEWAGE PIPE
SS	SERVICE SINK
ST	STORM DRAIN
TPS	TRAP PRIMER SYSTEM
TYP	TYPICAL
TW	DOMESTIC TEMPERED WATER
UR	URINAL
USGS	UNITED STATES GEOLOGICAL SURVEY
V	VENT
VTR	VENT THROUGH ROOF
W	WASTE
WC	WATER CLOSET
WCO	WALL CLEAN OUT
WF	WASH FOUNTAIN
WH	WALL HYDRANT
WMB	WASHING MACHINE BOX
WSFU	WATER SUPPLY FIXTURE UNITS

PLUMBING LEGEND

GAS VALVE	45°DOWN
PIPE ELBOW	SAN (UG) — SANITARY DRAIN UNDERGROUND
RISER UP	ST (UG) — STORM DRAIN UNDERGROUND
RISER DOWN	ST (OD) — STORM SECONDARY/ OVERFLOW DRAIN
BRANCH UP	SAN — SANITARY DRAIN
BRANCH DOWN	CW — DOMESTIC COLD WATER
DIRECTION OF FLOW	HW — DOMESTIC HOT WATER
	V — PLUMBING VENT

PLUMBING FIXTURE LIST

EWC-1 HALSEY TAYLOR MODEL HTVBBLQ, BI-LEVEL BARRIER FREE SELF-CONTAINED COOLER W/ SATIN FINISH WITH BOTTLE FILL STATION (OR EQUAL BY ELKAY)

RD-1 ROOF DRAIN: 15-1/4" DIA ROUND ROOF DRAIN WITH ADJUSTABLE EXTENSION SLEEVE, CAST IRON BODY W/ POLYETHYLENE DOME STRAINER, JAY R. SMITH MODEL #1015, SEE PLANS FOR SIZE (OR EQUAL BY ZURN)

OD-1 OVERFLOW ROOF DRAIN: 15-1/4" DIA ROUND ROOF DRAIN WITH ADJUSTABLE EXTENSION SLEEVE, CAST IRON BODY W/ POLYETHYLENE DOME STRAINER, AND 2" WATER DAM, JAY R. SMITH MODEL #1015, SEE PLANS FOR SIZE (OR EQUAL BY ZURN)

CN-1 STORM DRAIN CONDUCTOR NOZZLE, JAY R SMITH MODEL 1771, CAST BRONZE NOZZLE AND FLANGE FOR CONNECTION TO PVC LEADER PIPE (OR EQUAL BY ZURN)

MINIMUM SIZE CONNECTION

FIXTURE	SAN	HW	CW	VENT
ELECTRIC WATER COOLER	1 1/4"	—	1/2"	1 1/4"

FIXTURE UNIT VALUES

	DRAINAGE a	SUPPLY b		
FIXTURE	DFU	HW	CW	TOTAL
EWC/DRINKING FOUNTAIN	0.5	—	0.25	0.25

a. DRAINAGE FIXTURE UNIT VALUES (DFU) TAKEN FROM Michigan Plumbing Code/2018, CHAPTER 7, TABLE 709.1.

b. SUPPLY FIXTURE UNIT VALUES TAKEN FROM Michigan Plumbing Code/2018, APPENDIX E, TABLE E103.3(2).

WATER HAMMER ARRESTOR LEGEND

SYMBOL	PDI RATING	FIXTURE UNIT CAP
Ⓐ	A	1-11
Ⓑ	B	12-32

NOTES:
1. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER PLACEMENT OF WATER HAMMER ARRESTORS. REFER TO SPECIFICATION SECTION 221119 AND MANUFACTURERS RECOMMENDATIONS.

PLUMBING (DIVISION 22) SPECIFICATION:

PROVIDE EQUIPMENT INDICATED ON THE DRAWINGS, AND AS REQUIRED FOR A COMPLETE FUNCTIONING SYSTEM.

DEFINITIONS: FURNISH MEANS TO SUPPLY AND DELIVER TO PROJECT SITE, READY FOR INSTALLATION. INSTALL MEANS TO PLACE IN POSITION AND MAKE CONNECTIONS FOR SERVICE OR USE. PROVIDE MEANS TO FURNISH AND INSTALL, COMPLETE AND READY FOR INTENDED USE.

COORDINATION: COORDINATE WITH THE WORK OF OTHER TRADES, EQUIPMENT FURNISHED BY OTHERS, REQUIREMENTS OF THE OWNER, AND WITH THE CONSTRAINTS OF THE EXISTING CONDITIONS OF THE PROJECT SITE.

ALL PUBLIC LAVATORIES SHALL BE PROVIDED WITH APPROVED WATER TEMPERATURE LIMITING DEVICE THAT CONFORMS TO ASSE 1070.

ALL FLOOR DRAIN SHALL BE EQUIPPED WITH ASSE 1072 BARRIER STYLE TRAP SEAL; RECTORSEAL SURESEAL OR EQUAL.

DOMESTIC HOT AND COLD WATER PIPE TO BE TYPE L HARD COPPER TUBE WITH LEAD FREE SOLDERED OR PRESS-FIT JOINTS AND FITTINGS; PEX-A PLASTIC TUBE WITH BARB STYLE FITTINGS SHALL BE ALLOWED AS ALTERNATE TO COPPER TUBE WHERE CONCEALED ABOVE CEILINGS OR IN WALL CAVITIES.

PROVIDE STOP VALVES AT ALL WATER FIXTURE CONNECTIONS. PROVIDE BRONZE BODY BALL STOP&WASTE SHUT-OFF VALVES ON SUPPLY LINE TO ALL HOSE BIBBS, WALL HYDRANTS, PROVIDE BRONZE BODY BALL SHUT-OFF VALVES ON COLD AND HOT CONNECTIONS TO WATER HEATER.

PURGE AND DISINFECT ALL NEW POTABLE WATER PIPING PER REQUIREMENTS OF AWWA C651 OR C652, OR AS REQUIRED BY LOCAL HEALTH DEPARTMENT.

WASTE AND VENT PIPING TO BE SCH 40 SOLID CORE PVC PIPE FOR 2" AND SMALLER, AND SCH 40 FOAM CORE PVC FOR 3" AND LARGER. PVC WASTE AND VENT PIPING SHALL BE CONNECTED WITH SOLVENT WELDED JOINTS & FITTINGS.

PROVIDE CLEANOUTS FOR WASTE LINES AS SHOWN ON DRAWINGS, AND OF TYPE APPROVED BY LOCAL CODES.

VENT PIPE(S) THRU THE ROOF SHALL BE 3" MINIMUM AND EXTEND AT LEAST 1 FT ABOVE THE ROOF; PROVIDE ROOF JACK VENT PIPE FLASHING EACH PENETRATION WITH ALUMINUM BASE AND RUBBERIZED BOOT. CAULK JOINT BETWEEN VENT PIPE AND BOOT TO MAKE WEATHERTIGHT

STORM AND STORM OVERFLOW PIPING TO BE SCH 40 SOLID CORE PVC WITH SOLVENT WELDED JOINTS & FITTINGS.

PROVIDE BASE OF STACK CLEANOUT FOR ALL STORM PIPE STACKS AT FLOOR LEVEL

ALL STORM AND STORM OVERFLOW PIPING HORIZONTAL RUNS SHALL BE INSULATED WITH 1" THICKNESS OF PRE-FORMED FIBERGLASS PIPE INSULATION WITH FACTORY ASJ AND PVC ELBOW JACKETS. PIPE SUPPORTS WILL BE ALLOWED TO CONNECT DIRECTLY TO THE PIPE AND PIPE INSULATION IS NOT REQUIRED TO BE CONTINUOUS AT SUPPORTS.

PLUMBING CODE COMPLIANCE NOTES:

1. COMPLETED INSTALLATIONS SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES AND ORDINANCES INCLUDING, BUT NOT LIMITED TO THE LATEST EDITIONS OF THE FOLLOWING: 2012 INDIANA PLUMBING CODE.
2. CONTRACTOR SHALL PERFORM ALL REQUIRED TESTS OF SANITARY WASTE AND VENT SYSTEM AND DOMESTIC WATER SYSTEM AS IDENTIFIED IN SECTION 312 OF 2015 IPC.

GENERAL PLUMBING NOTES:

1. CONTRACTOR RESPONSIBLE FOR ALL REQUIRED PERMITS AND FEES RELATIVE TO THEIR WORK SCOPE.
2. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH ALL OTHER TRADES AND WITH INSTALLATION OF ALL PLUMBING SYSTEMS IN COMPLIANCE WITH THE 2018 MICHIGAN PLUMBING CODE AND ALL OTHER APPLICABLE STATE AND LOCAL CODES.
3. ROUTE ALL SANITARY & WASTE PIPING 2-1/2" AND LARGER AT 1/8" FALL PER FOOT UNLESS OTHERWISE NOTES; ROUTE ALL SANITARY & WASTE PIPING 2" AND SMALLER AT 1/4" FALL PER FOOT UNLESS OTHERWISE NOTED.
4. DRAIN AND VENT SIZES IDENTIFIED ON PLANS SUPERCEDE SIZES IDENTIFIED ON MINIMUM SIZE CONNECTION TABLE.
5. INSTALL WATER HAMMER ARRESTOR AT LOCATIONS SHOWN ON PLANS AND AT ALL QUICK CLOSING FIXTURES.
6. MAINTAIN AS-BUILT DRAWINGS IN THE FIELD; AS-BUILTS SHALL BE PROVIDED TO THE OWNER AS RECORD DRAWINGS WITH PROJECT CLOSE-OUT DOCUMENTS.
7. CONTRACTOR SHALL GUARANTEE WORK INSTALLED UNDER THEIR CONTRACT TO BE FREE FROM DEFECTIVE WORKMANSHIP OR MATERIALS FOR A PERIOD OF ONE (1) YEAR AFTER SUBSTANTIAL COMPLETION, AND SHALL REPAIR AND/OR REPLACE DEFECTIVE ITEMS AND DAMAGE RESULTING FROM FAILURE OF THESE ITEMS AT NO EXPENSE TO THE OWNER.

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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & CONSTRUCTION

Key Plan

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Project Manager	Discipline Lead: CJN
Designer: CJN	Reviewer
Date Issued: 9/18/2023	Project Number: 23005898A

Sheet Name

PLUMBING GENERAL INFORMATION & DETAILS

Drawing Number

P001

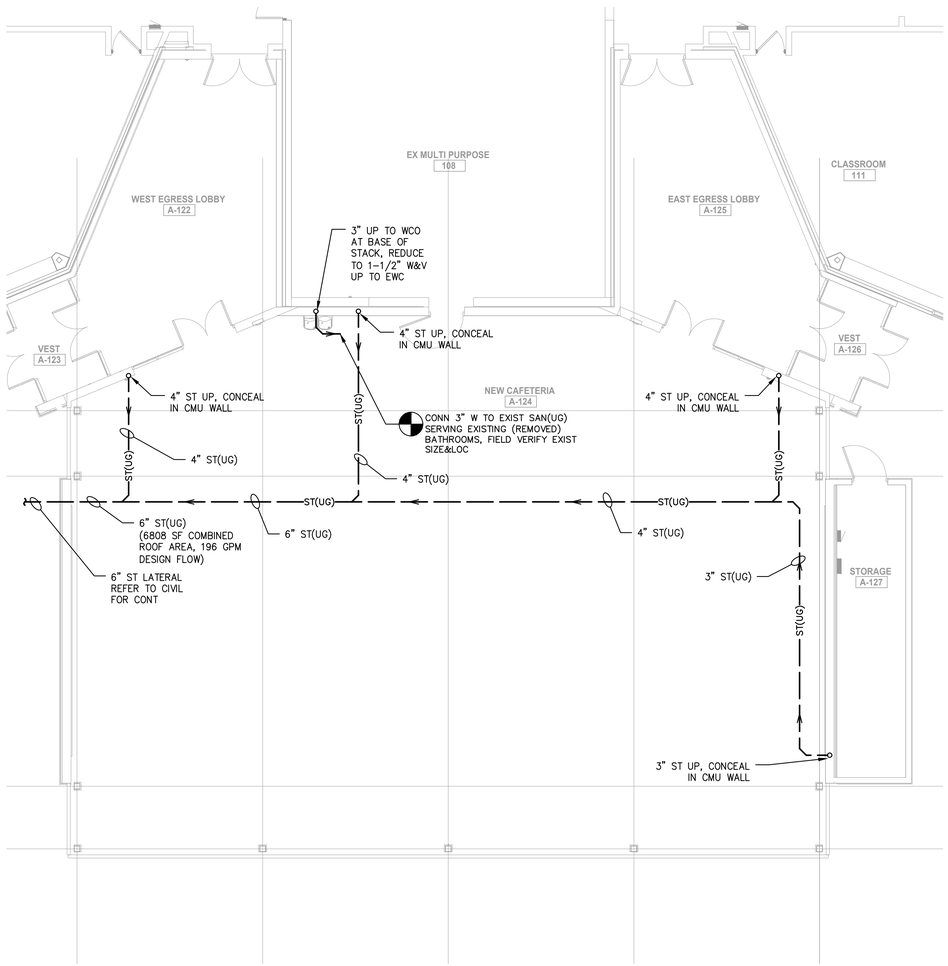
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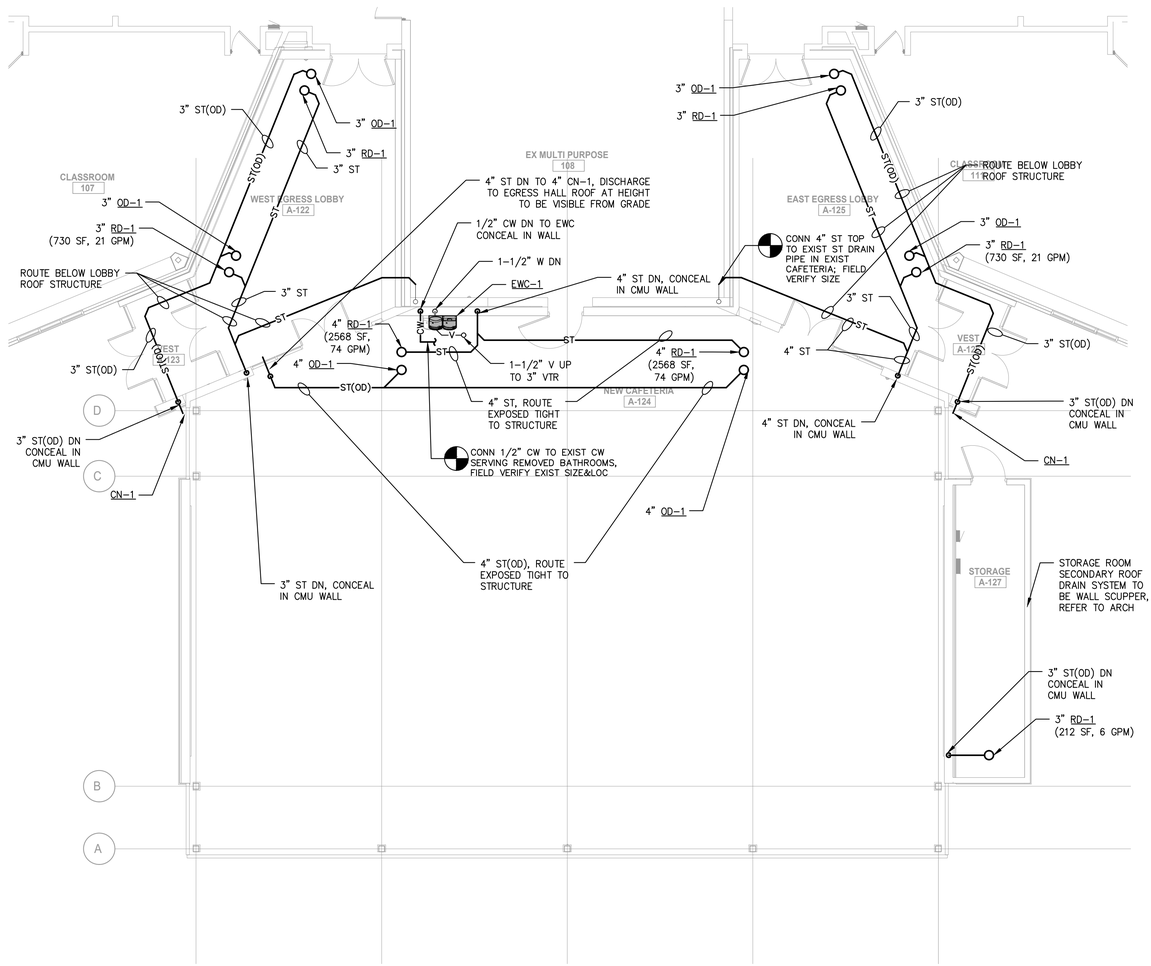
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2. ROUTE ALL SANITARY AND STORM PIPING AT ⅛" FALL PER FOOT UNLESS NOTED OTHERWISE.



PLUMBING BELOW GROUND PLAN
SCALE: 1/8" = 1'-0"



PLUMBING ABOVE GROUND PLAN
SCALE: 1/8" = 1'-0"

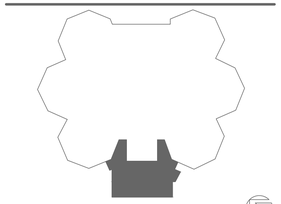
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & CONSTRUCTION



Key Plan

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Project Manager	Discipline Lead
	CJN
Designer	Reviewer
CJN	
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

PLUMBING PLAN

Drawing Number

P101

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ABBREVIATIONS

"	INCHES	BLDG	BUILDING
#	NUMBER	BMS	BUILDING MANAGMENT SYSTEM
&	AND	BOC	BOTTOM OF CONCTRETE
'	FEET		
1P	1 POLE (2P, 3P, 4P ETC.)	C	
@	AT	CAB	CABINET
CL	CENTERLINE	CAT	CATALOG
PL	PLATE	CATV	CABLE TELEVITION
Y	WYE	CB	CIRCUIT BREAKER
Ø	PHASE	CCTV	CLOSED CIRCUIT TELEVITION
Ø	DIAMETER	CKT	CIRCUIT
Δ	DELTA	CL	CURRENT LIMITING
		CLG	CEILING
A		CM	CEILING MOUNTED
A	AMPERE	CMPR	COMPRESSOR
ABC	ABOVE COUNTER	CND	CONDUIT
AC	ABOVE COUNTER	COMB	COMBINATION
AC	ALTERNATING CURRENT	CONN	CONNECTION
ACLG	ABOVE CEILING	CONST	CONSTRUCTION
AF	AMPERE FRAME RATING	CONT	CONTINUATION OR CONTINUOUS
AFC	ABOVE FINISH CEILING	CONT	CONTIINUOUS
AFF	ABOVE FINISH FLOOR	CONV	CONVECTOR
AFG	ABOVE FINISH GRADE	CP	CIRCULATION PUMP OR CONTROL PANEL
AFI	ARC FAULT CIRCUIT INTERRUPTER		
AHJ	ATHORITY HAVING JURISDICTION	CRT	CATHODE-RAY TUBE
AHU	AIR HANDLING UNIT	CT	CURRENT TRANSFORMER
AL/ALUM	ALUMINUM	CTR	CENTER OR COUNTER
ALT	ALTERNATE	CU	COPPER
AM	AMMETER		
AMP	AMPERE	D	
AMPL	AMPLIFIER	DC	DIRECT CURRENT
ANNUN	ANNUNCIATOR	DCP	DOMESTIC WATER CIRCULATING PUMB
APPROX	APPROXIMATELY	DDCP	DIRECT DIGITAL CONTROL PANEL
AQ-STAT	AQUASTAT	DE	DUAL ELEMENT
ARCH	ARCHITECT, ARCHITECTURAL	DEPT	DEPARTMENT
AS	AMP SWITCH RATING	DET	DETAIL
AT	AMP TRIP RATING	DIA	DIAMETER
ATS	AUTOMATIC TRANSFER SWITCH	DISC	DISCONNECT
AUTO	AUTOMATIC	DIST	DISTRIBUTION
AUX	AUXILIARY	DN	DOWN
AV	AUDIO VISUAL	DP	DOUBLE POLE
AWG	AMERICAN WIRE GAUGE	DPR	DAMPER
		DS	SAFETY DISCONNECT SWITCH
B		DT	DOUBLE THROW
B/	BOTTOM OF	DWG	DRAWING
BAS	BUILDING AUTOMATION SYSTEM		
BATT	BATTERY	E	
BD	BOARD	(E)	EXISTING TO REMAIN
BFC	BELOW FINISHED CEILING	(ER)	EXISTING TO BE RELOCATED
BKR	BREAKER	EC	ELECTRICAL CONTRACTOR

EF	EXHAUST FAN	HTG	HEATING
EGC	EQUIPMENT GROUND CONDUCTOR	HTR	HEATER
ELEC	ELECTRIC, ELECTRICAL	HV	HIGH VOLTAGE
ELEV	ELEVATOR	HVAC	HEATING, VENTILATION AND AIR CONDITIONING
EMERG	EMERGENCY		
EMS	ENERGY MANAGEMENT SYSTEM	HWP	HYDRONIC WATER PUMP
EMT	ELECTRICAL METALLIC TUBING	HZ	HERTZ
EP	ELECTRICAL PNEUMATIC		
EPO	EMERGENCY POWER OFF	I	
EQUIP	EQUIPMENT	IC	INTERRUPTER CAPACITY
ES	END SWITCH	IG	ISOLATED GROUND
ETR	EXISTING TO REMAIN	IMC	INTERMEDIATE METAL CONDUIT
EUH	ELECTTRIC UNIT HEATER	INC	INCANDESCENT
EWC	ELECTTRIC WATER COOLER	IR	INFRARED
EWH	ELECTTRIC WATER HEATER		
EXH	EXHAUST	J	
EXP	EXPLOSION PROOF	J-BOX, JB	JUNCTION BOX
F		K	
F	FUSED	k	KIPS
FA	FIRE ALARM	K-FT	KIP-FOOT
FACP	FIRE ALARM CONTROL PANEL	kcmil	THOUSAND CIRCULAR MILLS (MCM)
FBO	FURNISHED BY OTHERS	kV	KILOVOLT
FCU	FAN CONTROL UNIT	KVA	KILOVOLT-AMPHERE
FIXT	FIXTURE	KVAR	KILOVOLT-AMPERE REACTIVE
FLOUR	FLOURESCENT	KW	KILOWATT
FLR	FLOOR	KWH	KILOWATT HOUR
FU	FUSE		
FUDS	FUSED SAFETY DISCONNECT SWITCH	L	
FVNR	FULL VOLTAGE NON-REVERSING	LA	LIGHTING ARRESTOR
		LF	LINEAR FOOR
G		LOC	LOCATE OR LOCATION
GA	GUAGE	LT	LIGHT
GAL	GALLON	LTG	LIGHTING
GALV	GALVANIZED	LTNG	LIGHTNING
GC	GENERAL CONTRACTOR	LV	LOW VOLTAGE
GEN	GENERATOR		
GFI	GROUND FAULT PROTECTOR	M	
GFP	GROUND FAULT PROTECTOR	M/C	MOMENTARY CONTACT
GND, G	GROUND	mA	MILLIAMPHERE
GRS	GALVANIZED RIGID STEEL (CONDUIT)	MAG.S	MAGNETIC STARTER
GYP BD	GYPSUM BOARD	MAX	MAXIMUM
		MC	MECHANICAL CONTRACTOR
H		MCB	MAIN CIRCUIT BREAKER
HID	HIGH INTENSITY DISCHARGE	MCC	MOTOR CONTROL CENTER
HOA	HANDS-OFF-AUTOMATIC SWITCH	MDP	MAIN DISTRIBUTION PANEL
HORIZ	HORIZONTAL	MFR	MANUFACTURER
HP	HORSEPOWER	MFS	MAIN FUSED DISCONNECT SWITCH
HPF	HIGH POWER FACTOR	MH	MANHOLE
HT	HEIGHT	MIC	MICROPHONE
		MIN	MINIMUM

MISC	MISCELLANEOUS	PRI	PRIMARY
MLO	MAIN LUGS ONLY	PROJ	PROJECTION
MOA	MULTIOUTLET ASSEMBLY	PRV	POWER ROOF VENTILATOR
MSBD	MAIN SWITCHBOARD	PT	POTENTIAL TRANSFORMER
MT	MOUNT	PVC	POLYVINYL CHLORIDE (CONDUIT)
MT.C	EMPTY CONDUIT	PWR	POWER
MTR	MOTOR, MOTORIZED		
MTS	MANUAL TRANSFER SWITCH	Q	
MV	MEDIUM VOLTAGE	QUAN	QUANTITY
N		R	
(N)	NEW WORK	(R)	REMOVE
N	NEUTRAL	(RE)	RELOCTATED EXISTING
N.C.	NORMALLY CLOSED	RC	REMOTE CONTROL
N.O.	NORMALLY OPEN	RECPT	RECEPTACLE
NEC	NATIONAL ELECTRICAL CODE	REQD	REQUIRED
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION	RM	ROOM
		RMS	ROOT MEAN SQUARE
NF	NON-FUSED	RR	REMOVE AND REPLACE
NFDS	NON-FUSED SAFETY DISCONNECT SWITCH	RSC	RIGID STEEL CONDUIT
		RTU	ROOF TOP UNIT
NIC	NOT IN CONTRACT		
NL	NIGHT LIGHT - WIRE AHEAD OF SWITCH/CONTROL	S	
		S/N	SOLID NEUTRAL
No.	NUMBER	S/S	STOP/START PUSHBUTTONS
NPF	NORMAL POWER FACTOR	SC	SURFACE CONDUIT
NRTL	NATIONALLY RECOGNIZED TESTING LABORATORY	SD	REMOTE CONTROL
		SEC	SECONDARY
NTS	NOT TO SCALE	SF	SUPPLY FAN
NW	NORMAL WEIGHT	SHT	SHEET
		SIM	SIMILAR
O		SP	SPARE
OC	ON CENTER	SPD	SURGE PROTECTION DEVICE
OCPD	OVERCURRENT PROTECTION DEVICE	SPEC	SPECIFICATION
OH	OVERHEAD	SPKR	SPEAKER
OL	OVERLOADS	SQ. FT.	SQUARE FOOT
		SR	SURFACE RACEWAY
P		SS	STAINLESS STEEL OR SAFETY SWITCH
P	POLE	SSW	SELECTOR SWITCH
PA	PUBLIC ADDRESS	ST	SINGLE THROW
PB	PULL BOX OR PUSH BUTTON	STA	STATION
PC	PLUMBING CONTRACTOR	STD	STANDARD
PE	PHOTO ELECTRIC CELL	SURF	SURFACE MOUNTED
PED	PEDESTAL	SW	SWITCH
PF	POWER FACTOR	SWBD	SWITCHBOARD
PH	PHASE	SWGR	SWITCHGEAR
PIV	POST INDICATING VALVE	SYM	SYMMETRICAL
PNL	PANEL	SYS	SYSTEM
PP	POWER POLE		
PR	PAIR		

T	
T-STAT	THERMOSTAT
TEL	TELEPHONE
TEL/DATA	TELEPHONE/DATA
TERM	TERMINAL
TL	TWIST LOCK
TR	TAMPER RESISTANT
TS	TIME SWITCH
TTB	TELEPHONE TERMINAL BOARD
TTC	TELEPHONE TERMINAL CABINET
TV	TELEVISION
TVSS	TRANSIENT VOLT. SURGE SUPPRESSION
TVTC	TELEVISION TERMINAL CABINET
TYP	TYPICAL
U	
UC	UNDER COUNTER
UE	UNDERGROUND ELECTRICAL
UG	UNDERGROUND
UGE	UNDERGROUND ELECTRICAL
UGT	UNDERGROUND TELEPHONE
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UTIL	UTILITY
UV	UNIT VENTILATOR OR ULTRAVIOLET
V	
V	VOLT
V.I.F.	VERIFY IN FIELD
VA	VOLT-AMPERES
VDT	VIDEO DISPLAY TERMINAL
VERT	VERTICAL
VFC	VARIABLE FREQUENCY CONTROLLER
VFD	VARAIBLE FREQUENCY DRIVE
VM	VOLTMETER
VOL	VOLUME
W	
W	WATT OR WIRE
W/	WITH
W/O	WITHOUT
W/SF	WATTS PER SQUARE FOOT
WG	WIRE GUARD
WH	WATER HEATER
WP	WEATHERPROOF
X	
XFMR	TRANSFORMER
XFR	TRANSFER

REFERENCE SYMBOLS

- EQUIPMENT IDENTITY (SEE MECH EQUIPMENT ABBREVIATION LIST). EQUIPMENT NUMBER
- SYSTEM NUMBER (IF APPLICABLE)
- INDICATES PLAN & DETAIL NUMBER
- INDICATES DRAWING ON WHICH SECTION APPEARS
- INDICATES SECTION NUMBER
- INDICATES DRAWING ON WHICH SECTION APPEARS
- INDICATES MATCH LINE
- KEYNOTE INDICATOR
- KEYNOTE INDICATOR - DEMOLITION
- REVISION CLOUD

MOUNTING HEIGHTS

(UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE TO CENTERLINE OF BOXES).

CARD READER	42" AFF
CLOCK HANGER OULETS	42" AFF
EXIT LIGHTS - FLOOR PROXIMITY	8" AFF TO BOTTOM OF SIGN, 4" FROM FRONT EDGE OF SIGN TO DOOR FRAME.
EXIT LIGHTS - WALL MOUNTED	ABOVE DOORS (MAX. 96" AFF)
FIRE ALARM HORN/STROBE	84" AFF
FIRE ALARM PULL STATION	44" AFF
LIGHT SWITCHES	42" AFF
MOTOR STARTERS	72" MAX TO OPERATING HANDLE
PANEL BOARDS (LIGHTING AND RECEPTACLE)	72" MAX TO TOP CIRCUIT BREAKER
RECEPTACLE - TYPICAL	18" AFF (U.O.N.)
SAFETY SWITCHES	72" MAX TO OPERATING HANDLE
TELEPHONE - DATA OUTLET	18" AFF
TELEPHONE - PAY STATION	48" AFF
TELEPHONE - WALL TYPE	48" AFF

NOTE: REFER TO ARCHITECTURAL DRAWINGS FOR ADA LOCATIONS. ALL DEVICES TO BE MOUNTED WITHIN A RANGE OF 34" TO BOTTOM OF DEVICE BACKBOX TO 48" AFF TO TOP OF DEVICE BACKBOX. PREFERRED MOUNTING HEIGHT IS 48" AFF TO TOP OF DEVICE BACKBOX. CONTRACTOR TO MOUNT AT LOWER HEIGHT WITHIN THE LISTED RANGE TO OVERCOME ANY INTERFERENCES WHERE REQUIRED.

NOTE

NOT ALL SYMBOLS AND ABBREVIATIONS INDICATED APPEAR ONTHESE CONTRACT DRAWINGS. INDIVIDUAL DRAWINGS MAY HAVE SHEET LEGENDS FOR UNIQUE SYMBOLS AND FOR CONVENIENCE.

ELECTRICAL SYMBOL LIST

GENERAL

- LIGHT LINE WEIGHT INDICATES EXISTING ITEMS TO REMAIN OR PROVIDED BY OTHERS.
- HEAVY LINE WEIGHT INDICATES ITEMS TO BE PROVIDED BY E.C.
- HEAVY DASHED LINE INDICATES ITEMS TO BE REMOVED OR RELOCATED BY E.C.
- LIGHT FIXTURE UPPER CASE LETTERS INDICATE FIXTURE TYPE. REFER TO LUMINAIRE SCHEDULE FOR DETAILS. LOWER CASE LETTERS INDICATE SWITCHING ARRANGEMENT. NUMBER INDICATES BRANCH CIRCUIT. "EM" OR SHADING INDICATES EMERGENCY LIGHTING.
- EXIT SIGN LIGHT - WALL, CEILING OR PENDANT MOUNTED. LETTERS INDICATE FIXTURE TYPE. REFER TO LUMINAIRE SCHEDULE FOR DETAILS. ARROWS INDICATE DIRECTION. SHADING INDICATES NUMBER OF FACES.
- EXIT SIGN LIGHT WITH EMERGENCY LIGHT HEADS. LETTERS INDICATE FIXTURE TYPE. REFER TO LUMINAIRE SCHEDULE FOR DETAILS. SHADING INDICATES NUMBER OF FACES.
- DOCK LIGHT
- TRACK AND TRACK LIGHT
- EMERGENCY LIGHT HEADS - SINGLE HEAD AND DOUBLE HEADS
- EMERGENCY BATTERY LIGHTING UNIT. WIRE AHEAD OF LOCAL SWITCHING
- LIGHT ON CORD REEL
- LIGHT SWITCH 20A, 120/277V
  - " " SINGLE POLE
  - "K" KEY OPERATION
  - "3" 3-WAY OPERATION
  - "LVS" LOW VOLTAGE
  - "WP" WEATHER PROOF
  - "4" 4-WAY OPERATION
  - "a" SWITCHING ARRANGEMENT
  - "T" TIMER
  - "P" PILOT LIGHT
  - "OS" DUAL TECHNOLOGY WALL SWITCH TYPE OCCUPANCY SENSOR
  - "D/OS" DUAL TECHNOLOGY WALL SWITCH TYPE OCCUPANCY SENSOR WITH 0-10V DIMMING
  - "OS1" DUAL RELAY WALL SWITCH TYPE OCCUPANCY SENSOR
  - "OSZ" INFRARED WALL SWITCH TYPE OCCUPANCY SENSOR
  - "D" 0-10V WALL SWITCH DIMMER
  - "VS" WALL SWITCH TYPE VACANCY SENSOR
  - "D/VS" WALL SWITCH TYPE VACANCY SENSOR WITH 0-10V DIMMING
  - "D/S" WALL POD WITH PRESET SCENES AND 0-10V DIMMING
- OCCUPANCY SENSOR - CEILING MOUNTED
  - "A" - 1000 SQ. FT. COVERAGE
  - "B" - 2000 SQ. FT. COVERAGE
  - "C" - HALLWAY TYPE
  - "W"- WALL MOUNTED
- VACANCY SENSOR - CEILING MOUNTED
  - "A" - 1000 SQ. FT. COVERAGE
  - "B" - 2000 SQ. FT. COVERAGE
  - "W"- WALL MOUNTED
- "PP" - POWER PACK
- "PC" - PHOTOCELL FOR LIGHTING CONTROL
- "RC" - ROOM CONTROLLER
- "TC" - TIME CLOCK
- LIGHT LEVEL SENSOR - TYPE DENOTED

POWER

- POWER POLE
- LIGHTING ARRESTOR
- LIGHTNING PROTECTION AIR TERMINAL
- LIGHTNING PROTECTION CONDUCTOR SPLICE
- GROUND ROD
- GROUND ROD (PLAN VIEW)
- GROUND CONNECTION - EXOTHERMIC WELD
- GROUND TEST WELL
- GROUND CONNECTION TO STEEL OR STRUCTURE
- JUNCTION BOX CEILING/WALL MOUNTED "FA" - FURNITURE POWER "FD" - FURNITURE DATA "DA" - DOOR ACTUATOR "HD" - HAND DRYER
- PULL BOX
- BUILDING GROUND BAR
- TELECOM GROUND BAR
- PANELBOARD / DISTRIBUTION PANEL / SWITCHBOARD. SURFACE MOUNTED, FLUSH MOUNTED
- MEDIUM VOLTAGE DRAWOUT CIRCUIT BREAKER
- DRAWOUT CIRCUIT BREAKER
- DRAWOUT CIRCUIT BREAKER SPACE
- MOLDED CASE CIRCUIT BREAKER
- ENCLOSED CIRCUIT BREAKER
- TRANSFORMER
- GENERATOR
- MOTOR
- MANUAL MOTOR STARTER WITH THERMAL OVERLOAD
- MAG. MOTOR STARTER OR CONTACTOR
- COMB. MOTOR STARTER (NON-FUSED)
- COMB. MOTOR STARTER (FUSED)
- COMBINATION STARTER WITH RESET BUTTON, HAND OPERATED ACTUATOR, AND INDICATOR LIGHT

POWER

- FUSE
- SAFETY DISC. SW. (NON-FUSED) 25A 3P
- SAFETY DISC. SW. (FUSED) 25A 3P
- VARIABLE FREQUENCY CONTROLLER
- BUS DUCT WITH PLUG UN DISCONNECT (FUSED)
- CONDUIT CONCEALED IN WALL OR OVERHEAD. CONDUIT SHOWN WITHOUT SLASH MARKS SHALL CONTAIN 2 #12 & 1#12G CONDUCTORS IN 3/4" CONDUIT UNLESS SPECIFIC EQUIPMENT REQUIRES A DIFFERENT SIZE.
- CONDUIT SHOWN WITH SLASH MARKS SHALL CONTAIN 1#12 CONDUCTOR PER SLASH MARK IN 3/4" CONDUIT UNLESS THE CONDUCTOR SIZE AND CONDUIT SIZE ARE SHOWN ADJACENT TO THE SLASH MARKS. SLASH MARK INDICATORS ARE: SHORT STRAIGHT=PHASE CONDUCTOR, LONG STRAIGHT=NEUTRAL CONDUCTOR, SHORT BENT ENDED=SWITCH LEGS, LONG STRAIGHT WITH A DOT=GROUND CONDUCTOR.
- CONDUIT CONCEALED
- CONDUIT EXPOSED
- SURFACE RACEWAY
- CONDUIT TRANSITION UP
- CONDUIT TRANSITION DOWN
- CONDUIT STUBBED OUT
- HEAT TRACE WIRING
- HOMERUN TO PANEL BOARD. LETTERS INDICATE PANEL NAME. ARROWS INDICATE NUMBER OF CIRCUITS. NUMBERS INDICATE CIRCUIT DESIGNATIONS IN PANEL.

POWER

- SINGLE RECEPT.120V,20A, NEMA 5-20R UNLESS NOTED OTHERWISE
- DUPLEX RECEPT.120V,20A, NEMA 5-20R UNLESS NOTED OTHERWISE
  - "WP" - WEATHERPROOF TYPE WITH WEATHER - PROOF WHILE IN USE COVER
  - "GFI" - GROUND FAULT INTERRUPTER, 4-6mA TYPE
  - "AC" - ABOVE COUNTER. 6" ABOVE COUNTER TO BOTTOM OF DEVICE
  - "UC" - UNDER COUNTER
  - "IC" - IN CABINETRY, RECESSED RECEPTACLE
  - "DF" - MOUNTED WITHIN DRINKING FOUNTAIN CABINETRY. COORDINATE MOUNTING HEIGHT IN FIELD USING APPROVED MANUFACTURER CUT SHEETS
  - "C" - CEILING MOUNTED
  - "USB" - WITH USB
  - "USB-C" - WITH USB TYPE C
  - "TR" - TAMPER RESISTANT
  - "CR" - CONTROLLED RECEPTACLE
- SPLIT DUPLEX RECEPT.
- ISOLATED GROUND RECEPT (DUPLEX)
- RECEPT ON EMERGENCY CKT (DUPLEX)
- QUADRUPLEX RECEPT. 120V,20A, NEMA 5-20R UNLESS NOTED OTHERWISE
- QUADRUPLEX RECEPTACLE ON EMERGENCY CIRCUIT
- 240 VOLT RECEPT.
- FLOOR RECEPT. (DUPLEX SHOWN)
- RECEPT ON DROP CORD (DUPLEX SHOWN)
- RECEPT ON CORD REEL (DUPLEX SHOWN)
- SPECIAL RECEPTACLE. NEMA CONFIGURATION AND RATING AS INDICATED
- P&S PIN & SLEEVE CONNECTOR / RECEPTACLE
- CONNECTION TO EQUIPMENT REFER TO EQUIPMENT SCHEDULE FOR DETAILS
- EQUIPMENT PLUG
- MULTIPLE SERVICE OUTLET
- MULTIPLE SERVICE FLR OUTLET
- MULTIOUTLET ASSEMBLY / PLUGMOLD
- EMERGENCY OFF PUSH BUTTON

SIGNAL

- "DI" DOOR INTERLOCK
- "DO" ELECTRIC DOOR OPERATOR
- "EH" ELECTRIC HINGE
- "EL" ELECTRIC LATCH
- "ES" ELECTRIC STRIKE
- "MS" MOTION SENSOR FOR ACCESS CONTROL
- "PS" POWER SUPPLY FOR ACCESS CONTROL
- "RE" REQUEST TO EXIT DEVICE
- "R" RELAY
- "S" DOOR STATUS CONTACTS
- "ML" MEGNETIC LOCK
- "DC" DOOR CONTACTS
- "CR" CARD READER
- "KP" KEYPAD
- "WAP" WIRELESS ACCESS POINT
- CCTV CAMERA F=FIXED, P=PAN, T=TILT, Z= ZOOM
- SPEAKER (WALL OR CEILING MT.)
- NURSE CALL DOME LIGHT (4 LAMP)
- NURSE CALL EMERG. STATION
- NURSE CALL CODE BLUE EMERG. STATION
- NURSE CALL DUTY STATION
- NURSE CALL STAFF STATION
- NURSE CALL PATIENT PULL STATION
- NURSE CALL SINGLE PATIENT STATION
- NURSE CALL DUAL PATIENT STATION
- NURSE CALL MASTER STATION
- NURSE CALL EQUIPMENT CABINET
- NURSE CALL ANNUNCIATOR PANEL
- VOLUME CONTROL
- HUMIDISTAT
- THERMOSTAT
- TELEPHONE OUTLET BOX TWO GANG JUNCTION BOX WITH 1 " CONDUIT STUBBED TO 6" ABOVE NEAREST ACCESSIBLE CEILING, NYLON BUSHING ON CONDUIT END, AND ALL RACEWAYS. ALL CABLING, TERMINATIONS AND TESTING BY OTHERS.
- DATA OUTLET BOX TWO GANG JUNCTION BOX WITH 1 " CONDUIT STUBBED TO 6" ABOVE NEAREST ACCESSIBLE CEILING, NYLON BUSHING ON CONDUIT END, AND ALL RACEWAYS. ALL CABLING, TERMINATIONS AND TESTING BY OTHERS.
- COMBINATION TELE/DATA OUTLET BOX TWO GANG JUNCTION BOX WITH 1 " CONDUIT STUBBED TO 6" ABOVE NEAREST ACCESSIBLE CEILING, NYLON BUSHING ON CONDUIT END, AND ALL RACEWAYS. ALL CABLING, TERMINATIONS AND TESTING BY OTHERS.
- TELEVISION OUTLET CEILING OR WALL MOUNT
- MULTIPLE SERVICE FLR OUTLET
- MULTIOUTLET ASSEMBLY
- CLOCK (WALL MOUNT)
- UNDERFLOOR RACEWAY SYSTEM
- CABLE TRAY. "FS" INDICATES FIRE STOP LOCATION
- CONDUIT SLEEVE

SITE

- POLE WITH STANCHION MOUNTED LIGHT FIXTURE. LETTERS INDICATED FIXTURE TYPE ON LIGHTING FIXTURE SCHEDULE. NUMBER INDICATES BRANCH CIRCUIT.
- BOLLARD LIGHTING FIXTURE. LETTER INDICATE FIXTURE TYPE ON LIGHTING FIXTURE SCHEDULE. NUMBER INDICATES BRANCH CIRCUIT.

SITE

- EXTERIOR WALL MOUNTED LIGHTING FIXTURE. LETTER INDICATES FIXTURE TYPE ON LIGHTING FIXTURE SCHEDULE. NUMBER INDICATES BRANCH CIRCUIT.
- UTILITY SERVICE POLE
- "UE" UNDERGROUND ELECTRIC
- "UMVE" UNDERGROUND MEDIUM VOLTAGE ELECTRIC
- "UT" UNDERGROUND TELEPHONE
- "UCOM" UNDERGROUND COMMUNICATIONS
- "UTV" UNDERGROUND CABLE TELEVISION (CATV OR CCTV)
- "UFIBR" UNDERGROUND FIBER OPTIC
- "AE" AERIAL ELECTRIC LINE
- "OHT" OVERHEAD TELEPHONE
- "OHE" OVERHEAD ELECTRIC

FIRE ALARM

- CONTROL UNIT (PANEL)
  - "AMP" AMPLIFIER RACK
  - "FAA" FIRE ALARM ANNUNCIATOR
  - "FACP" FIRE ALARM CONTROL PANEL
  - "NAC" NOTIFICATION CIRCUIT POWER BOOSTER EXTENDER PANEL
- INTERFACE AND SUPERVISORY DEVICES
  - "DH" DOOR HOLDER
  - "EOL" END OF LINE
  - "F" MANUAL PULL STATION
  - "WF" FLOW DETECTOR
  - "VS" VALVE SUPERFISORY SWITCH
- FIRE ALARM INDICATION DEVICE
  - "AIM" ADDRESSABLE INPUT MODULE
  - "AOM" ADDRESSABLE OUTPUT CONTROL MODULE
  - "H" HEAT DETECTION TYPE
    - "R/F" = COMBINATION RISE/FIXED TEMPERTURE
    - "F" = FIXED TEMPERTURE
    - "R" = RATE OF RISE ONLY
  - "S" SMOKE DETECTOR/SENSOR
    - "I" = IONIZATION
    - "P" = PHOTOELECTRIC
    - "BR" = BEAM RECEIVER
    - "BT" = BEAM TRANSMITTER
  - "SS" SMOKE DETECTOR SINGLE STATION
- SMOKE DETECTOR/SENSOR FOR DUCT
- BELL TROUBLE
- COMBINATION HORN/VISIBLE "CD" CANDELA RATING/SETTING
- COMBINATION SPEAKER/VISIBLE "CD" CANDELA RATING/SETTING "C" = CEILING MOUNT
- HORN ONLY
- SPEAKER ONLY - WALL MOUNT "C" CEILING MOUNT
- REMOTE ALARM INDICATING AND TEST SWITCH
- REMOTE INDICATOR
- VISIBLE ONLY (STROBE) WALL / CEILING CD - CANDELA RATING / SETTING
- VISIBLE ONLY (STROBE) EMERGENCY WALL / CEILING CD - CANDELA RATING / SETTING
- COMBINATION SPEAKER / VISIBLE APPLIANCE "C" CEIILNG MOUNT
- CO2 CARBON DIOXIDE DETECTOR
- CO CARBON MONOXIDE DETECTOR

GENERAL NOTES:

1. MINIMUM CIRCUIT BREAKER SIZE FOR CONDUITS SHOWN ON PLANS IS 20A, 1 POLE FOR 120VAC UNLESS OTHERWISE NOTED/SHOWN ON PLANS
2. MINIMUM BRANCH CIRCUIT WIRING SHALL BE #12 AWG. DERATE CONDUCTORS PER NEC FOR VOLTAGE DROP AND CONDUIT FILL.
3. PROVIDE GROUNDING PER NEC (ARTICLE 250).
4. PROVIDE A SEPARATE NEUTRAL CONDUCTOR FROM PANELBOARD FOR EACH BRANCH CIRCUIT.
5. CONTRACTOR SHALL COORDINATE WORK WITH ASSOCIATED TRADES.
6. CONTRACTOR SHALL SEAL WITH AN APPROVED METHOD ALL ELECTRICAL PENETRATIONS THRU FIRE FLOOR/PROOF/RATED WALLS, FLOORS, CEILINGS OR OTHER AREAS.
7. CONTRACTOR SHALL PROVIDE FUSES SIZED PER MANUFACTURERS RECOMMENDATIONS FOR ALL EQUIPMENT INSTALLED WITH FUSED STARTERS OR DISCONNECTS.
8. ALL EXTERIOR PVC CONDUIT SHALL TRANSITION TO RGS CONDUIT WITHIN 18" OF FOUNDATION WALL PRIOR TO PASSING THRU THAT WALL.
9. CONTRACTOR SHALL PROVIDE RACEWAY, WIRE, CABLE AND ASSOCIATED FITTINGS ALONG WITH COMPLETE CONNECTIONS REQUIRED FOR BRANCH CIRCUITS FROM DEVICES TO FINAL OVERCURRENT DEVICE AND LOCAL CONTROL DEVICE(S) PER PROJECT SPECIFICATIONS.
10. VERIFY EXACT LOCATION OF ELECTRICAL CONNECTION POINTS IN THE FIELD.
11. CONDUIT SHALL BE CONCEALED WITHIN WALLS AND CEILINGS WHERE POSSIBLE. SOME CONDUIT SYSTEMS SHALL BE EXPOSED DUE TO THE CONSTRUCTION OF THE BUILDING. CONTRACTOR SHALL STRIVE TO CONSOLIDATE CONDUITS AND ARRANGE IN A GEOMETRICALLY ALIGNED FASHION TO HAVE A LOW IMPACT ON THE AESTHETICS OF THE SPACE. CONDUIT SHALL BE ROUTED FROM THE CORRIDOR DIRECTLY INTO EACH ROOM, NOT ROUTED FROM ROOM TO ROOM. CONTRACTOR SHALL PROVIDE AND NOTIFY CONSULTANT FOR REVIEW OF THE INSTALLED CONDUIT LAYOUT EARLY IN THE PROJECT. CONDUIT INSTALLATION SHALL CONTINUE UPON CONSULTANT APPROVAL AND IS SUBJECT TO MODIFICATIONS AS THE CONSULTANT SEES FIT. EXPOSED CONDUITS SHALL BE PAINTED TO MATCH SURROUNDING CONDITIONS. REFER TO CONSTRUCTION COORDINATION REQUIREMENTS IN THE PROJECT SPECIFICATIONS.
12. REFER TO LIFE SAFETY AND ARCHITECTURAL PLANS FOR FIRE RATING REQUIREMENTS. BACKBOXES IN THESE AREAS SHALL HAVE A 1 HR MINIMUM UL LISTED FIRE RATING.
13. PROVIDE LIGHTING CONTROLS INCLUDING DEVICE ITSELF, CONDUIT, CONDUCTORS, 0-10V WIRING, POWER PACKS, SLAVE PACKS, CONNECTORS, AND OTHER ACCESSORIES FOR A COMPLETE AND OPERATIONAL SYSTEM.
14. RECEPTACLES AND TELECOMMUNICATION BOXES SHALL NOT LOCATED BACK-TO-BACK ON WALL. PROVIDE A MINIMUM OF 6" OF SEPARATION BETWEEN BOXES.

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ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
5/26/2023	DESIGN DEVELOPMENT PACKAGE
6/22/2023	OWNER REVIEW
9/18/2023	BIDS & PERMITS

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Designer	Reviewer
C ROSEKRANS	A ROBINSON
Date Issued	Project Number
9/18/2023	23005898A

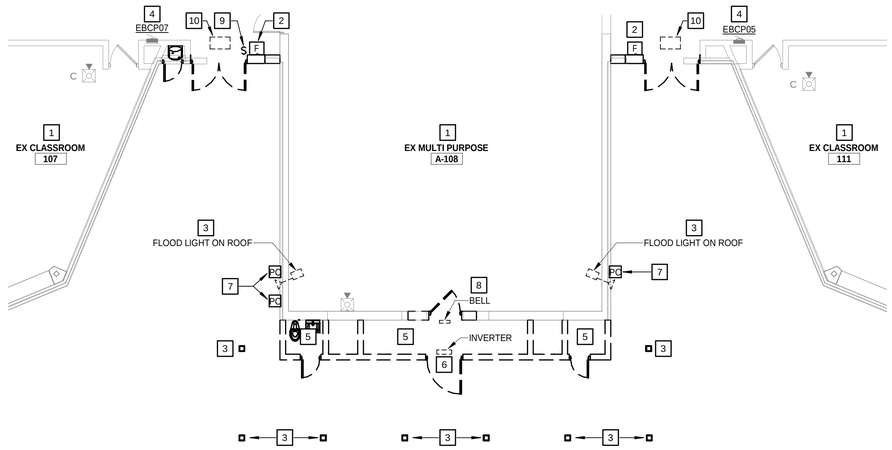
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1 ELECTRICAL DEMOLITION PLAN

SCALE : 1/8" = 1'-0"

GENERAL NOTES:

A. ANY EXISTING CONDITIONS INDICATED ARE BASED ON INFORMATION PROVIDED BY OTHERS AND POSSIBLE LIMITED FIELD VERIFICATION. THE CONTRACTOR SHALL ADJUST FOR THE ACTUAL FIELD CONDITIONS AT NO EXPENSE TO THE OWNER.

B. THE CONTRACTOR SHALL VISIT THE PROJECT SITE, REVIEW EXISTING CONDITIONS AGAINST THE PLANS, AND FAMILIARIZE THEMSELF WITH THE WORK PRIOR TO BIDDING AND START OF THE WORK.

C. THE CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF EXISTING EQUIPMENT, DEVICES, AND LUMINAIRES AS INDICATED AND/OR AS REQUIRED TO ALLOW FOR INSTALLATION AND CONSTRUCTION OF THE NEW WORK. REMOVE ALL EQUIPMENT, DEVICES, LUMINAIRES, CONDUITS, SUPPORTS, HANGERS, ECT. THAT ARE NOT SHOWN AND ARE REQUIRED TO BE REMOVED IN ORDER TO COMPLETE THE NEW WORK.

D. CONTRACTOR SHALL DISCONNECT AND REMOVE ALL DEVICES IN WALLS BEING REMOVED. REMOVE BOXES, CONDUITS, AND WIRE TO SOURCE OR FIRST JUNCTION BOX TO MAINTAIN EXISTING DEVICES ON SAME CIRUIT.

E. MAINTAIN CONTINUITY OF EXISTING CIRCUITS AS REQUIRED TO PROVIDE POWER TO REMAINING EQUIPMENT, DEVICES, AND LUMINAIRES THAT ARE NOT BEING REMOVED.

KEYNOTES

1 NO WORK IN SPACE.

2 DISCONNECT FIRE ALARM DEVICE FOR RELOCATION. REMOVE CONDUIT AND WIRE TO FIRST JUNCTION BOX. DEVICES ON CIRCUIT SHALL REMAIN ACTIVE. REFER TO NEW PLANS.

3 DISCONNECT AND REMOVE LIGHT FIXTURE. REMOVE CONDUIT AND WIRE TO SOURCE.

4 EQUIPMENT SHALL REMAIN

5 DISCONNECT AND REMOVE ALL LIGHTING AND DEVICES IN SPACE. REMOVE ALL CONDUIT AND WIRE TO FIRST JUNCTION BOX. ALL DEVICES REMAINING ON CIRCUIT SHALL REMAIN ACTIVE.

6 DISCONNECT AND REMOVE EMERGENCY LIGHTING INVERTER FOR RELOCATION. REMOVE CONDUIT AND WIRE BACK TO MULTI PURPOSE ROOM. REFER TO NEW POWER PLANS FOR NEW LOCATION OF INVERTER.

7 DISCONNECT AND REMOVE PHOTOCELL. REMOVE ALL CONDUIT AND WIRE TO SOURCE.

8 DISCONNECT AND REMOVE EXISTING EXTERIOR BELL FOR RELOCATION. REMOVE CONDUIT AND WIRE TO INSIDE BUILDING. REFER TO NEW POWER PLANS FOR NEW LOCATION OF BELL.

9 DISCONNECT AND REMOVE LIGHT SWITCH FOR RELOCATION. REMOVE RACEWAY TO ABOVE CEILING, DISPOSE OF RACEWAY. REFER TO NEW POWER PLANS FOR NEW LOCATION OF LIGHT SWITCH.

10 EQUIPMENT TO BE REMOVED BY OTHERS. DISCONNECT FOR REMOVAL. REMOVE ALL EXPOSED CONDUIT AND ALL WIRE SOURCE. CAP ALL CONDUIT BELOW CONCRETE FLOORS AND AT CONCRETE WALLS AND PATCH/REPAIR CONCRETE FLUSH TO FINISHED FLOORS/WALLS.

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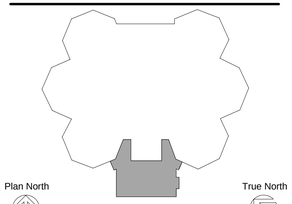
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Date Issued	Project Number
9/18/2023	2300589BA

Sheet Name

ELECTRICAL DEMOLITION PLAN

Drawing Number

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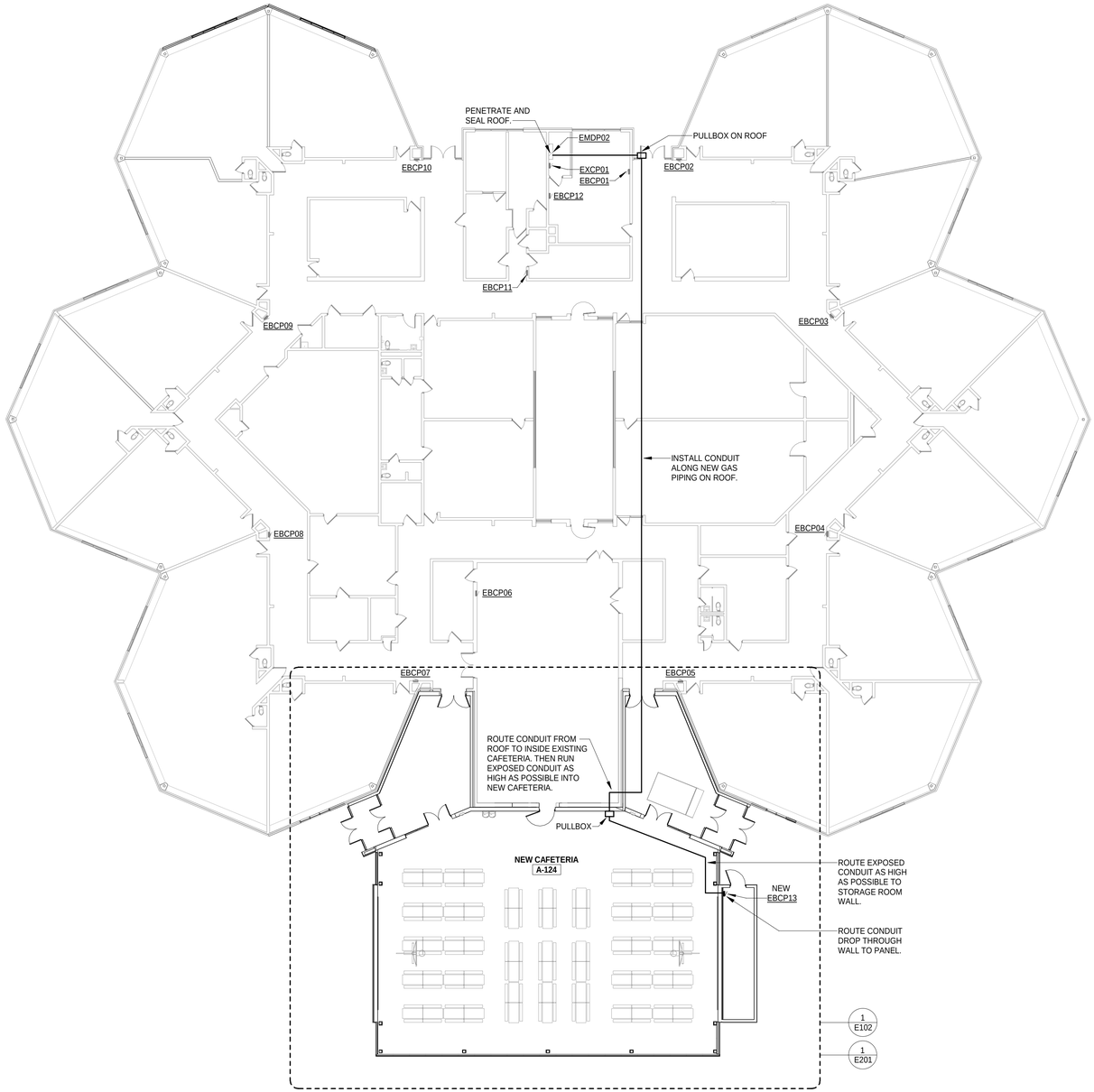
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GENERAL NOTES:

A. ALL ELECTRICAL EQUIPMENT SHOWN IS EXISTING UNLESS NOTED OTHERWISE.

B. CONTRACTOR SHALL ROUTE NEW FEEDER CONDUITS ON ROOF. PROVIDE SUPPORTS ON ROOF FOR FEEDER CONDUITS. REINSTALL AND PATCH CEILING/WALLS AS REQUIRED. COORDINATE FINAL ROUTING WITH OWNER.



1 OVERALL ELECTRICAL PLAN - FOR REFERENCE

SCALE : 1/16" = 1'-0"

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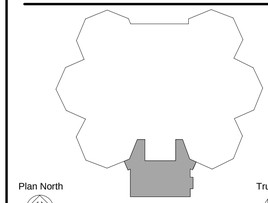
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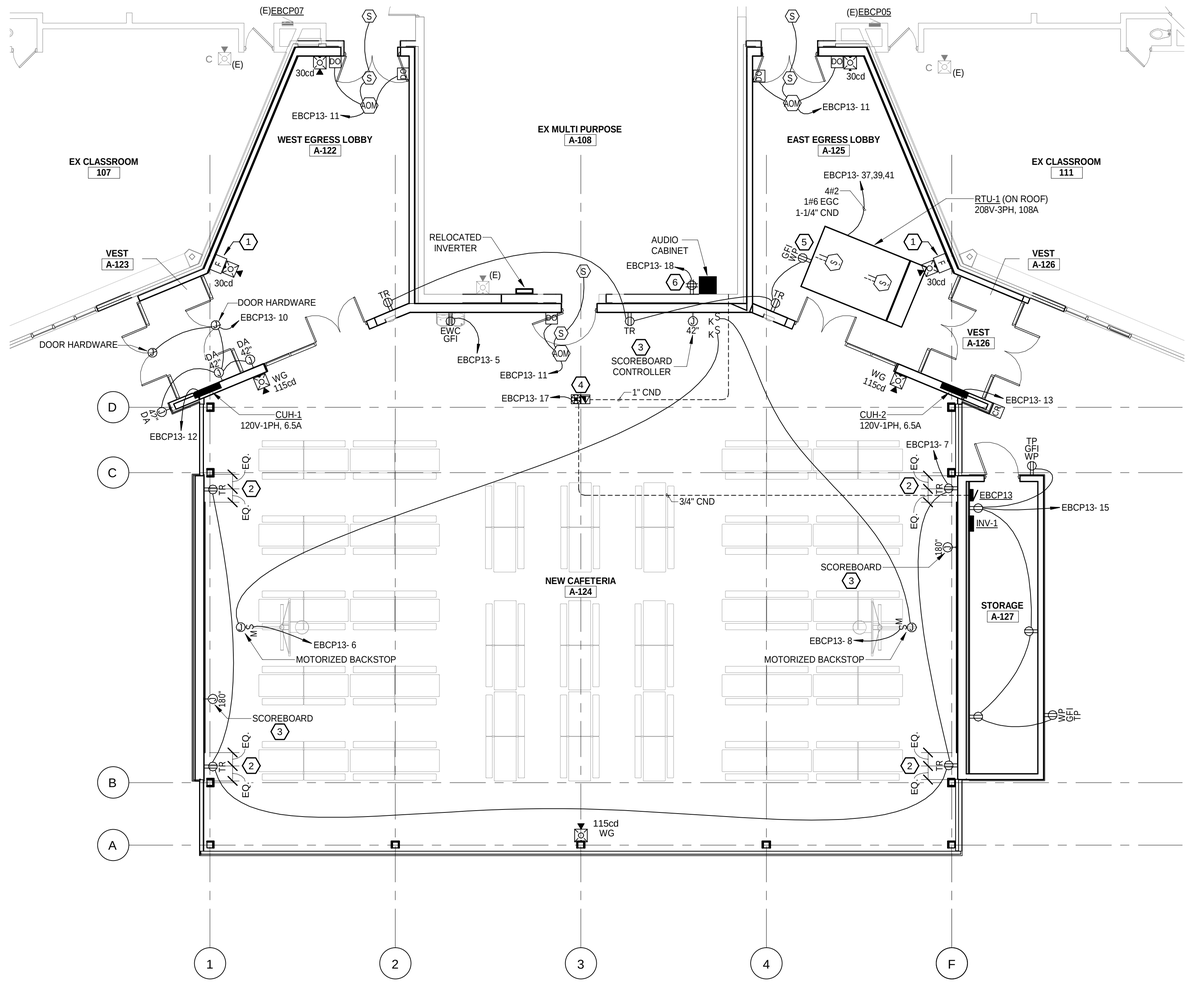
OVERALL ELECTRICAL PLAN

Drawing Number

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1 ENLARGED POWER PLAN - ADDITION

SCALE : 1/8" = 1'-0"

GENERAL NOTES:

A. CONTRACTOR SHALL PROVIDE GFCI BREAKER IN LIEU OF GFCI RECEPTACLES FOR ALL INACCESSIBLE DEVICES.

KEYNOTES

1 RELOCATED FIRE ALARM DEVICE. EXTEND EXISTING CIRCUIT TO NEW LOCATION.

2 CENTER DEVICE BETWEEN EDGE OF MASONARY AND WALL PAD.

3 PROVIDE JUNCTION BOX FOR FUTURE SCOREBOARD. ROUTE (1) 3/4" CONDUIT TO PANEL EBCP13 FOR FUTURE POWER. ROUTE (1) 1" CONDUIT TO SCOREBOARD CONTROLLER FOR FUTURE DATA.

4 PROVIDE RECESSED CONCRETE ON GRADE FLOORBOX EQUAL TO WIREMOLD #RFB4-CI SERIES. PROVIDE 2 DUPLEXES, BARRIER KIT, OPENINGS FOR LOW VOLTAGE DEVICES, BLANK COVERS, AND FPBTCBK COVER ASSEMBLY. COMMUNICATION DEVICES BY OTHERS. PROVIDE ¾-INCH CONDUIT FOR POWER AND 1-INCH CONDUIT FOR LOW VOLTAGE. ROUTE LOW VOLTAGE CONDUIT TO A/V SYSTEM, COORDINATE WITH OWNER. PROVIDE ALL NECESSARY COMPONENTS FOR A COMPLETE AND NEAT INSTALALTION.

5 DUPLEX RECEPTACLE PROVIDED WITH RTU. CIRCUIT AS SHOWN.

6 COORDINATE LOCATION OF QUADPLEX WITH TECHNOLOGY AV CONTRACTOR.

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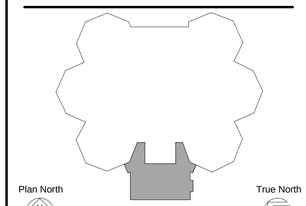
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION SO-1790

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
5/26/2023	DESIGN DEVELOPMENT PACKAGE
6/22/2023	OWNER REVIEW
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	A ROBINSON
Designer	Reviewer
C ROSEKRANS	A ROBINSON
Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

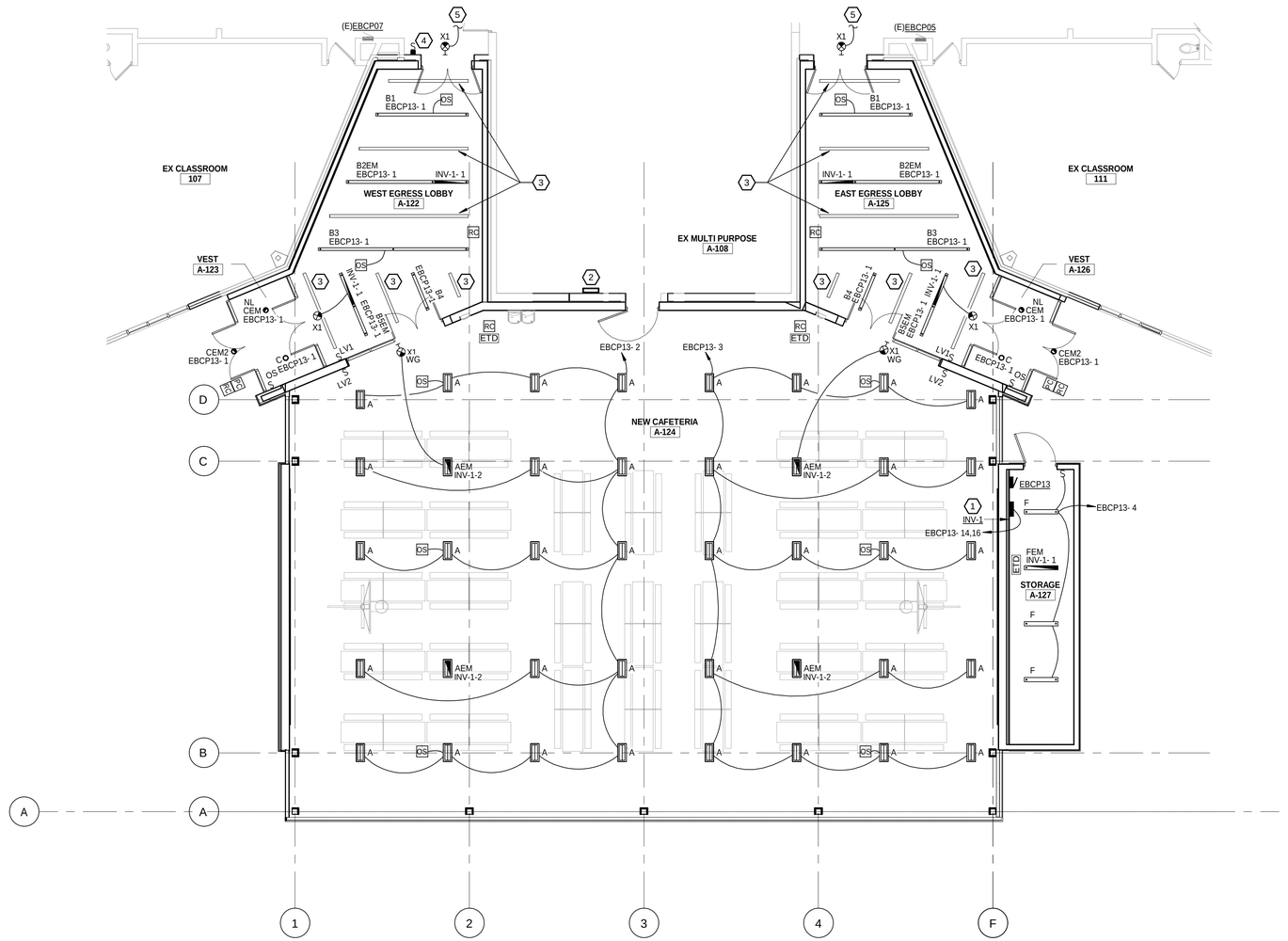
ENLARGED POWER PLAN - ADDITION

Drawing Number

E102

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ARCH D 24x36



1 ENLARGED LIGHTING PLAN - ADDITION
SCALE : 1/8" = 1'-0"

KEYNOTES

1. PROVIDE EMERGENCY LIGHTING INVERTER, MINIMUM 550VA.
2. RELOCATION OF EXISTING EMERGENCY LIGHTING INVERTER. EXTEND EXISTING CONDUIT AND WIRE TO NEW LOCATION.
3. FOR UNLIT SECTIONS OF LINEAR BAFFLE REFER TO ARCHITECTURAL SHEETS A121 AND A141.
4. RELOCATED LIGHT SWITCH. EXTEND CIRCUIT TO NEW LOCAITON. PROVIDE NEW LEGRAND NONMETALLIC SINGLE CHANNEL RACEWAY MICRO SERIES, D-LINE, OR EQUALIVALENT.
5. CIRCUIT NEW EXIT SIGN TO EXISTING EMERGENCY CIRCUIT IN SPACE.

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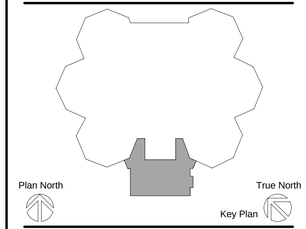
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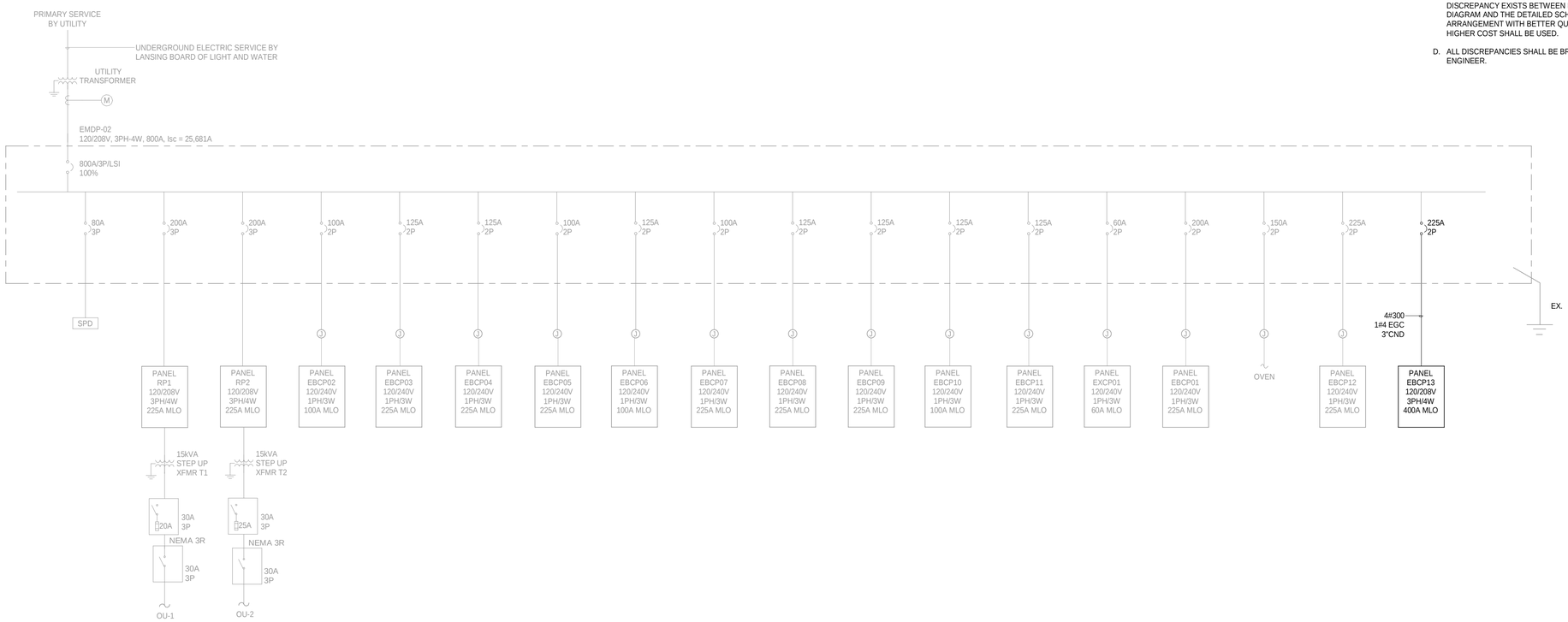
ENLARGED LIGHTING PLAN - ADDITION

Drawing Number

E201

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ARCH D 24x36



1 REVISED ONE LINE DIAGRAM

SCALE : N.T.S.

SINGLE LINE DIAGRAM NOTES:

A. ALL EQUIPMENT, CONDUCTORS, AND CONDUITS ARE EXISTING UNLESS NOTED OTHERWISE

B. OVERCURRENT DEVICES OF ENTIRE DISTRIBUTION SYSTEM SHALL MEET STATED FAULT CURRENT VALUES WITH FULLY RATED EQUIPMENT.

C. REFER TO SWITCHBOARD SCHEDULES AND DISTRIBUTION PANEL SCHEDULES FOR ADDITIONAL REQUIREMENTS. WHERE A DISCREPANCY EXISTS BETWEEN EQUIPMENT ON THE SINGLE LINE DIAGRAM AND THE DETAILED SCHEDULES, THE ITEM OR ARRANGEMENT WITH BETTER QUALITY, GREATER QUANTITY, OR HIGHER COST SHALL BE USED.

D. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

NEC ELECTRICAL LOAD SUMMARY - PANEL MDP (SERVICE)

	CONNECTED LOADS								DEMAND LOADS						
PANEL	LARGEST MOTOR	MECH/MOTOR	LIGHTING	RECEPT.	HEAT	AC	KITCHEN	OTHER	LARGEST MOTOR	MECH	LIGHTING	RECEPT.	LARGER HEAT VS AC	KITCHEN	OTHER
EXIST. PEAK DEMAND		126555.0		4680.0				77500.0	43558.6	130761.0	3873.8	7020.0	0.0	0.0	98552.0
NEW LOADS	34846.9056	4206.0	3099	2340				21052.0							
TOTAL KW	34846.9	130761.0	3099.0	7020.0	0.0	0.0	0.0	98552.0							
SYSTEM VOLTAGE	208.0	V	SYSTEM PHASE	3.0											
CONNECTED:	274278.9	VA													
DEMAND:	283765.4	VA													
CONNECTED:	1318.6	A													
DEMAND:	788.6	A													

Branch Panel: EBCP13

Location: STORAGE A-127
Supply From: EMDP-02
Mounting: SURFACE
Enclosure: NEMA1

Volts: 208Y/120
Phases: 3
Wires: 4

A.I.C. Rating: 10,000 AMPS SYMMETRICAL
Mains Type: MLO
Mains Rating: 400 A

Notes:

CKT	Circuit Description	Trip	Poles	PHASE A		PHASE B		PHASE C		Poles	Trip	Circuit Description	CKT
1	LIGHTING A-122, 125	20 A	1	328	864					1	20 A	WEST GYM LIGHTING A-124	2
3	EAST GYM LIGHTING A-124	20 A	1			864	170			1	20 A	LIGHTING A-127	4
5	EWC A-124	20 A	1					900	1176	1	20 A	WEST MOTOR BACKSTOP A-124	6
7	RCPTS A-124	20 A	1	720	1176					1	20 A	EAST MOTOR BACKSTOP A-124	8
9	RCPTS A-122,124,125	20 A	1			720	1900			1	20 A	DOOR HARDWARE A-123	10
11	AOM A-122, A-124, A-125	20 A	1					1501	780	1	15 A	CUH-1	12
13	CUH-2	15 A	1	780	102					2	20 A	INV-1	14
15	RCPTS A-127 & EXTERIOR	20 A	1			900	202						16
17	GYM FLOOR POWER A-124	20 A	1					360	360	1	20 A	SOUND CABINET A-124	18
19	SPARE	20 A	1	0	--					1	--	SPACE	20
21	SPARE	20 A	1			0	--			1	--	SPACE	22
23	SPARE	20 A	1					0	--	1	--	SPACE	24
25	SPACE	--	1	--	--					1	--	SPACE	26
27	SPACE	--	1			--	--			1	--	SPACE	28
29	SPACE	--	1					--	--	1	--	SPACE	30
31	SPACE	--	1	--	--					1	--	SPACE	32
33	SPACE	--	1			--	--			1	--	SPACE	34
35	SPACE	--	1					--	--	1	--	SPACE	36
37				7488	--					1	--	SPACE	38
39	RTU-1	125 A	3			7488	--			1	--	SPACE	40
41								7488	--	1	--	SPACE	42
			Total Load:	11422.5 VA		12241.6 VA		11165.4 VA					
			Total Amps:	95.5 A		102.3 A		93 A					

Load Classification	Connected Load	Demand Factor	Estimated...	Panel Totals	
Lighting	2478.5 VA	125%	3098.2 VA		
Motor	26376 VA	121%	31992 VA	Total Conn. Load:	34768.4 VA
Other	2421.2 VA	100%	2421.2 VA	Total Est. Demand:	41003 VA
RCPT	3960 VA	100%	3960 VA	Total Conn.:	96.5 A
LITES	22.2 VA	125%	27.8 VA	Total Est. Demand:	113.8 A

Notes:

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Discipline Lead: A ROBINSON
Designer: C ROSEKRANS
Reviewer: A ROBINSON
Date Issued: 9/18/2023
Project Number: 23005898A

Sheet Name

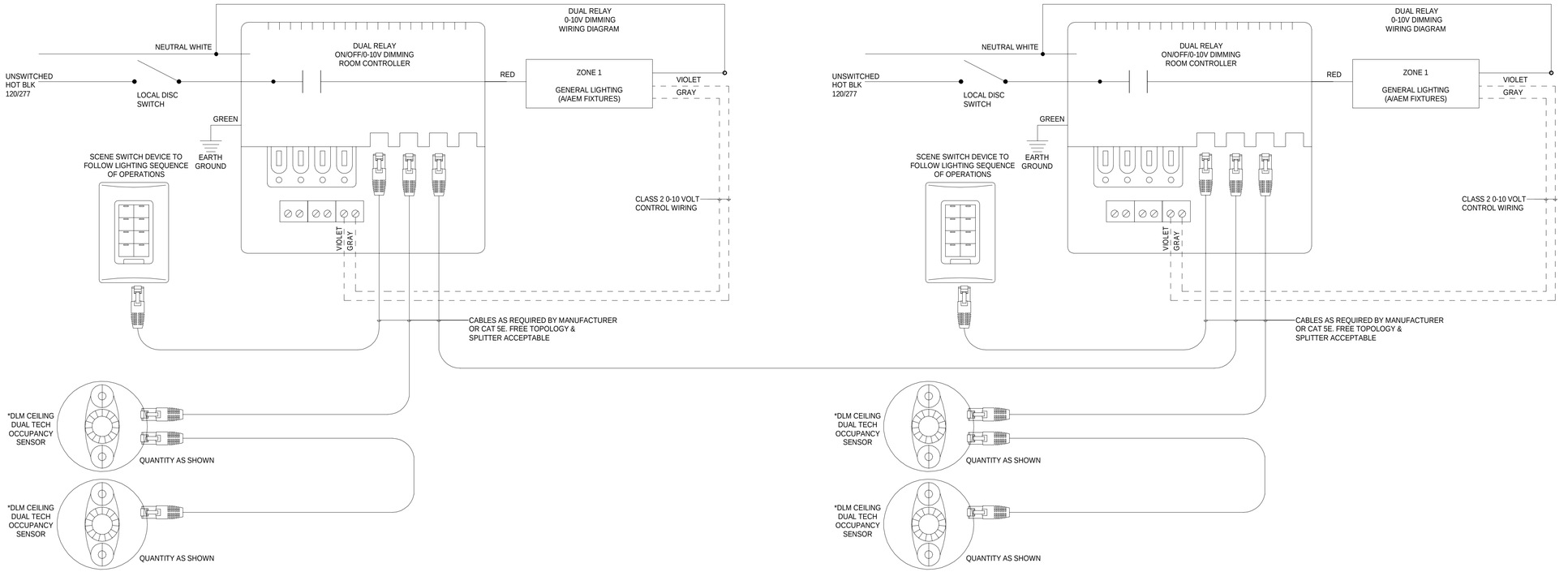
ONE-LINE AND SCHEDULES

Drawing Number

E601

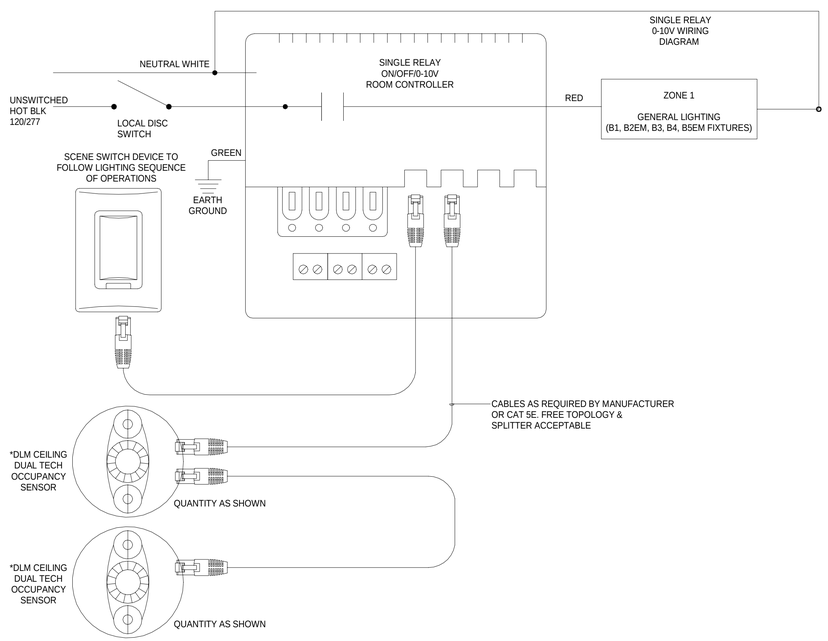
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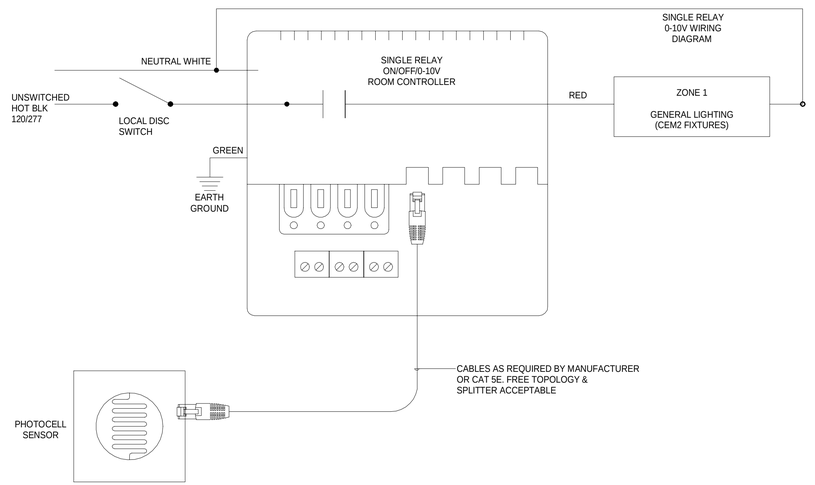
1 ROOM CONTROLLER DETAIL WITH REMOTE OCCUPANCY SENSORS

SCALE : 3/8" = 1'-0"



2 ROOM CONTROLLER DETAIL WITH NO DIMMING

SCALE : 3/8" = 1'-0"



3 ROOM CONTROLLER DETAIL WITH REMOTE PHOTOCELL

SCALE : 3/8" = 1'-0"

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DIAGRAMS

Drawing Number

E602

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LUMINAIRE SCHEDULE

TYPE	LAMP	MANUFACTURER	MODEL NUMBER	BALLAST/DRIVER	MOUNTING	INPUT WATTAGE	DESCRIPTION	NOTE
A	8000 LUMENS, 4000K, LED	LITHONIA	IBG-8000LM-SEF-ATL-WD-MVOLT-GZ10-40K-80CRI	0-10V	PENDANT MOUNT 19' 0" AFF	48W	RECTLINEAR HIGH-BAY PENDANT.	
		COLUMBIA	PELA-740-L09-B-ED-U-PM					
		WILLIAMS	GH-2-L80/840-FA-GC2/Y18/5-DIM-UNV					
		METALUX	OHB-9SE-W-120V-L840-CD-C6-Y-TOGGLE-10-2PK					
AEM	8000 LUMENS, 4000K, LED	LITHONIA	IBG-8000LM-SEF-ATL-WD-MVOLT-GZ10-40K-80CRI-ETS	0-10V	PENDANT MOUNT 19' 0" AFF	48W	RECTLINEAR HIGH-BAY PENDANT.	1
		COLUMBIA	PELA-740-L09-B-ED-U-PM-DTS					
		WILLIAMS	GH-2-L80/840-FA-GC2/Y18/5-DIM-UNV					
		METALUX	OHB-9SE-W-120V-L840-CD-C6-Y-TOGGLE-10-2PK					
B1	200 LUMENS PER FT, 4000K, LED	FOCAL POINT	ASM25-BW-12-300LF-40K-1C-UNV-LD1-J24-DTS-__-11ft 0in	0-10V	PENDANT MOUNT 9' 6" AFF	22W	2-INCH WIDE 11-FOOT 0-INCH PENDANT MOUNT LINEAR WITH ACOUSTIC MATERIAL WRAP.	
		PMC LIGHTING	AK3512-D-AC-40K-030-11'-0"-B-UNV					
B2EM	200 LUMENS PER FT, 4000K, LED	FOCAL POINT	ASM25-BW-12-300LF-40K-1C1Z-UNV-LD1-J24-1ECD-DTS-__-14ft 6in	0-10V	PENDANT MOUNT 9' 6" AFF	30W	2-INCH WIDE 14-FOOT 6-INCH PENDANT MOUNT LINEAR WITH ACOUSTIC MATERIAL WRAP. WIRE SECTION OF FIXTURE AS SHOWN TO INVERTER.	1, 2
		PMC LIGHTING	AK3512-D-AC-40K-030-14'-6"-B-UNV					
B3	200 LUMENS PER FT, 4000K, LED	FOCAL POINT	ASM25-BW-12-300LF-40K-1C-UNV-LD1-J24-DTS-__-17ft 10in	0-10V	PENDANT MOUNT 9' 6" AFF	36W	2-INCH WIDE 17-FOOT 10-INCH PENDANT MOUNT LINEAR WITH ACOUSTIC MATERIAL WRAP.	
		PMC LIGHTING	AK3512-D-AC-40K-030-17'-10"-B-UNV					
B4	200 LUMENS PER FT, 4000K, LED	FOCAL POINT	ASM25-BW-12-300LF-40K-1C-UNV-LD1-J24-DTS-__-4ft 9in	0-10V	PENDANT MOUNT 9' 6" AFF	8.6W	2-INCH WIDE 4-FOOT 9-INCH PENDANT MOUNT LINEAR WITH ACOUSTIC MATERIAL WRAP.	
		PMC LIGHTING	AK3512-D-AC-40K-030-4'-9"-B-UNV					
B5EM	200 LUMENS PER FT, 4000K, LED	FOCAL POINT	ASM25-BW-12-300LF-40K-1C1Z-1C-UNV-LD1-J24-1ECD-DTS-__-8ft 0in	0-10V	PENDANT MOUNT 9' 6" AFF	16W	2-INCH WIDE 8-FOOT 0-INCH PENDANT MOUNT LINEAR WITH ACOUSTIC MATERIAL WRAP. WIRE SECTION OF FIXTURE AS SHOWN TO INVERTER.	1, 2
		PMC LIGHTING	AK3512-D-AC-40K-030-8'-0"-B-UNV					
C	1500 LUMEN, 3500K, LED	PRESCOLITE	LTR-6RD-H-SL-DM1-LTR-6RD-T-SL-35K-8-MD-SS	0-10V	5/8" GYP. CEILING	17.0W	6" RECESSED CAN.	
		GOTHAM	EVO6-35/20-AR-LSS-ND-MVOLT-GZ1-90CRI					
		PORTFOLIO	LD6C-15-90-35-D010-MD					
		WILLIAMS	6DR-TL-L15/935-DIM-UNV-OM-OF-CS-MWT-N-F1					
CEM	1500 LUMEN, 3500K, LED	PRESCOLITE	LTR-6RD-H-SL-DM1-EM-LTR-6RD-T-SL-35K-8-MD-SS	0-10V	5/8" GYP. CEILING	17.0W	6" RECESSED CAN. PROVIDE WITH INTEGRAL EMERGENCY BATTERY.	2
		GOTHAM	EVO9-35/20-AR-LSS-ND-MVOLT-GZ1-EL-90CRI					
		PORTFOLIO	LD6C-15-90-35-D010-MD-EM14					
		WILLIAMS	6DR-TL-L15/935-EM10W-DIM-UNV-OM-OF-CS-MWT-N-F1					
CEM2	1500 LUMEN, 3500K, LED	PRESCOLITE	LTR-6RD-H-SL-DM1-EM-LTR-6RD-T-SL-35K-8-MD-SS	0-10V	EXTERIOR CANOPY	17.0W	6" RECESSED CAN. PROVIDE WITH INTEGRAL EMERGENCY BATTERY AND REMOTE PHOTOCELL.	
		GOTHAM	EVO6-35/20-AR-LSS-ND-MVOLT-GZ1-EL-90CRI					
		PORTFOLIO	LD6C-15-90-35-D010-MD-EM14					
		WILLIAMS	6DR-TL-L15/935-EM10W-DIM-UNV-OM-OF-CS-MWT-N-F1					
F	3000 LUMEN, 3000K, LED	COLUMBIA	MPS-4-30-VW-F-W-ED-U	0-10V	PENDANT 8' AFF	30W	4' STRIP FIXTURE. PROVIDE CHAIN HANGERS.	
		LUMAX	CNLED31L3K48-9FAF					
		LITHONIA	ZL1F-L48-SMR-3000LM-MDD-MVOLT-30K-80CRI-WH					
		WILLIAMS	75R-4-L30/830-VBY-2-DIM-UNV					
FEM	3000 LUMEN, 3000K, LED	COLUMBIA	MPS-4-30-VW-F-W-ED-U	0-10V	PENDANT 8' AFF	30W	4' STRIP FIXTURE. PROVIDE CHAIN HANGERS.	1
		LUMAX	CNLED31L3K48-9FAF					
		LITHONIA	ZL1F-L48-SMR-3000LM-MDD-MVOLT-30K-80CRI-WH					
		WILLIAMS	75R-4-L30/830-VBY-2-DIM-UNV					
X1	LED	COMPASS	CER	-	UNIVERSAL	1W	WHITE POLYCARBONATE EXIT SIGN WITH RED LETTERS AND BATTERY.	
		LITHONIA	LQM-LED-R					
		SURE-LITES	LPX-7					
		WILLIAMS	EXIT-R-EM-WHT-D					

NOTES: 1. WIRE TO INVERTER AND ETD.
2. WIRE AS NIGHT LIGHT.

SEQUENCE OF OPERATION:

1. LIGHTING CONTROL INTENTION IS TO USE LIGHT FIXTURES WITH INTEGRATED CONTROLS AND ASSOCIATED LOW VOLTAGE SWITCHES, UNLESS NOTED OTHERWISE. DEVIATION FROM THIS SOLUTION SHALL MEET CONTROL INTENTIONS AND COORDINATED WITH ELECTRICAL CONTRACTOR FOR ADDITIONAL WIRING AND INSTALLATION.
2. ALL SWITCHES WITH "LV#" ARE LOW VOLTAGE CONTROL STATIONS. PROVIDE ON/OFF BUTTONS, PRE-PROGRAMMED SCENES, INTEGRAL OCCUPANCY SENSING, AND/OR DIMMING CONTROL AS DESCRIBED BELOW PER SPACE.
3. ALL EMERGENCY FIXTURES SHALL BE PROGRAMMED TO FUNCTION WITH AREA NORMAL LIGHTS, UNLESS NOTED AS NIGHT LIGHTS. UPON LOSS OF POWER, EMERGENCY FIXTURES SHALL ILLUMINATE TO 100% OF RATED POWER.
4. COORDINATE COMMISSIONING OF SYSTEM PER LIGHTING, LIGHTING CONTROL, AND COMMISSIONING SPECIFICATIONS WITH OWNER'S AGENT AS REQUIRED PER STATE OF MICHIGAN ENERGY CODE.
5. **EXTERIOR FIXTURES:**
   - **A.** BUILDING LUMINAIRES SHALL TURN ON 30-MINUTES PRIOR TO SUNSET AND REMAIN ON UNTIL MIDNIGHT. BETWEEN MIDNIGHT AND 6AM, FIXTURES SHALL REMAIN OFF. AT 6AM FIXTURES SHALL TURN ON AT 100% AND REMAIN ON UNTIL 30-MINUTES AFTER SUNRISE.
   - **B.** BUILDING EGRESS LUMINAIRES BE PROGRAMMED TO TURN ON 30-MINUTES PRIOR TO SUNSET AND STAY ON 30-MINUTES AFTER SUNRISE. UPON LOSS OF POWER, BATTERY SHALL POWER LIGHT FIXTURES.
6. **NEW CAFETERIA:**
   - **A.** SPACE SHALL BE PROGRAMMED TO TURN LIGHTS ON TO 50% UPON ENTRANCE INTO SPACE AND OFF AFTER 20-MINUTES OF NO ACTIVITY.
   - **B.** LV1 STATIONS SHALL INCLUDE:
     - LUNCH (65%)
     - ACTIVITY (100%)
     - ALL ON/OFF.
     - DIM UP/DOWN.
7. **HALLWAY, VESTIBULE:**
   - A. LIGHTING COME ON AUTOMATICALLY AT 100% UPON ENTRANCE TO SPACE VIA CEILING LOW VOLTAGE OCCUPANCY SENSOR.
   - B. LOCATE POWER PACK ABOVE SWITCH AT DOOR ENTRANCE.
   - C. LIGHTING SHALL REMAIN ON UNTIL 20-MINUTES AFTER NO ACTIVITY AND THEN GO OFF.
   - D. FIXTURES SHOWN AS EMERGENCY SHALL BE PROGRAMMED AS NIGHT LIGHTS.
   - E. LIGHT FIXTURES WITH INTEGRATED CONTROLS ARE ACCEPTABLE AS ALTERNATE CONTROL.
   - F. LV2 (HALLWAY): STATION SHALL INCLUDE:
     - ON
     - OFF

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Date Issued	Project Number
9/18/2023	23005898A

Sheet Name

SCHEDULES

Drawing Number

E801

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COMMUNICATION SYMBOL LEGEND

SYMBOL	DESCRIPTION
◇1	THIS SYMBOL WITH A NUMBER INSIDE REFERS TO KEYNOTES. REFER TO NOTES ON THE SHEET OR WITHIN THE DETAIL FOR ADDITIONAL INFORMATION
A	EQUIPMENT SCHEDULE. THIS SYMBOL WITH LETTERS INSIDE REFERS EQUIPMENT SCHEDULES, SEE DETAILS AND EQUIPMENT SCHEDULES ON TC101, TC301, TC501 AND TC701.
1	CABLE SCHEDULE. THIS SYMBOL WITH NUMBERS INSIDE REFERS EQUIPMENT SCHEDULES, SEE DETAILS AND EQUIPMENT SCHEDULES ON TC101, TC301, TC501 AND TC701.
◇ X XXXX	DATA COMMUNICATIONS OUTLET CONNECTIVITY CODE. X IS A 1 THRU 99. SEE TC1XX SHEETS FOR SPECIFIC REQUIREMENTS. XXXX NOTES THAT THE CABLE IS FOR A SPECIFIC USE
◇ X 12:08	SINGLE SIDED DIGITAL CLOCK. SEE CONNECTIVITY CODE FOR CLOCK TYPE.

ABBREVIATIONS

ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
2G	TWO-GANG BOX - PROVIDED BY EC	NIC	NOT IN CONTRACT
AC	ABOVE COUNTER - INSTALL BACKBOX SAME HEIGHT AS OTHER ELECTRICAL OUTLETS ABOVE THE COUNTER.	PBO	PROVIDED BY OTHERS
AFF	ABOVE FINISHED FLOOR	PCO-1	PATCH CORD ORGANIZER - 1 UNIT HIGH
AFG	ABOVE FINISHED GROUND	PCO-2	PATCH CORD ORGANIZER - 2 UNITS HIGH
AWG	AMERICAN WIRE GAUGE	PET	PROTECTED ENTRANCE TERMINAL
EMT	EMT TYPE CONDUIT	QTY	QUANTITY
EC	ELECTRICAL CONTRACTOR		

CABLE SCHEDULE

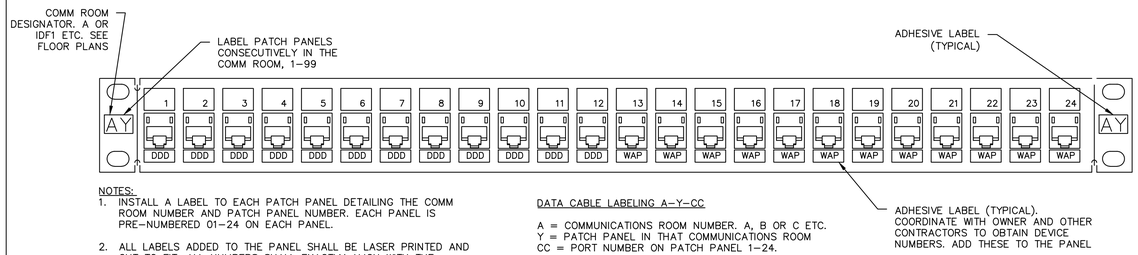
MARK	DESCRIPTION	MANUFACTURER	PART NO.
1	CAT-6 UTP CABLES. BLUE IN COLOR. SEE CONNECTIVITY CODES	MOHAWK	M58281
2	CAT-6 UTP CABLES. GREEN IN COLOR. SEE CONNECTIVITY CODES	MOHAWK	M58286
3	CAT-6 UTP CABLES. YELLOW IN COLOR. SEE CONNECTIVITY CODES	MOHAWK	M58283
4	CAT-6 UTP CABLES FOR USB CONNECTIVITY SHALL BE ORANGE IN COLOR	MOHAWK	M58288

IP CLOCK EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	PART NO.
TA	DIGITAL CLOCK, 2.5" GREEN DIGITS, WALL MOUNT.	SAPLING	SBP-31S-254-OG

COMMUNICATION EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	PART NO.
A	SINGLE RACK UNIT PATCH CORD ORGANIZER (PCO-1) WITH HINGED COVER.	HUBBELL	HS13C
B	PATCH PANEL-24 PORT, EQUIPPED WITH 8-PIN MODULAR JACKS TO MATCH THE CABLE COLOR AND CABLE TYPE BEING TERMINATED. PROVIDE ONE MODULAR JACK FOR EACH CABLE BEING TERMINATED. SEE SPEC AND DRAWINGS FOR COLORS. EQUIP WITH REAR CABLE ORGANIZER	HUBBELL	PANEL: HPJ24 ORGANIZER: ECMBR3



NOTES:
1. INSTALL A LABEL TO EACH PATCH PANEL DETAILING THE COMM ROOM NUMBER AND PATCH PANEL NUMBER. EACH PANEL IS PRE-NUMBERED 01-24 ON EACH PANEL.
2. ALL LABELS ADDED TO THE PANEL SHALL BE LASER PRINTED AND CUT TO FIT. ALL NUMBERS SHALL EXACTLY ALIGN WITH THE LOCATION ON THE PATCH PANEL.
3. IF THE PANEL IS NOT PRE-LABELED 01-24 THEN THE CONTRACTOR SHALL INSTALL A LABEL FOR EACH PORT.
4. THE CABLES SHALL BE TERMINATED ON THE PATCH PANEL IN NUMERICAL ORDER. NO EXCEPTIONS.
5. ADD LABELS FOR CAMERA NUMBERS OR WAP NUMBERS DEPENDING UPON PATCH PANEL. SEE RACK LAYOUTS TO DETERMINE IF CAMERA AND WAP CABLES WILL BE ON SEPARATE OR SHARED PATCHPANELS

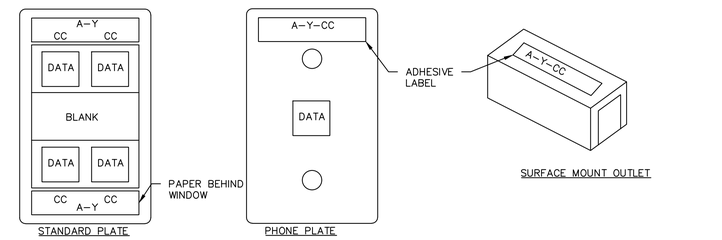
DATA CABLE LABELING A-Y-CC

A = COMMUNICATIONS ROOM NUMBER. A, B OR C ETC.
Y = PATCH PANEL IN THAT COMMUNICATIONS ROOM
CC = PORT NUMBER ON PATCH PANEL 1-24.

DDD = CAMERA NUMBER. MEET WITH OWNER AND SECURITY CONTRACTOR TO OBTAIN THIS NUMBER

WAP = WAP NUMBER. MEET WITH OWNER TO OBTAIN THIS NUMBER

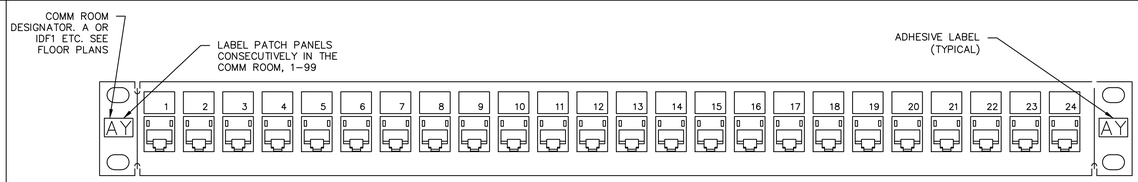
3 TC101 CAMERA OR WIRELESS PANEL LABELING



NOTES:
1. INSTALL A PAPER LABEL BEHIND THE PLASTIC WINDOW IN STANDARD PLATES THAT ARE EQUIPPED WITH THE WINDOWS.
2. PROVIDE ADHESIVE LABELS ON WALL PHONE PLATES & SURFACE MOUNT OUTLETS & PLATES WITHOUT LABELING WINDOWS.

DATA CABLE LABEL:
A = COMMUNICATIONS ROOM, A, B, ETC.
Y = PATCH PANEL IN THAT RACK OR CABINET 1-X
CC = PORT ON THAT PANEL FROM 01-24

1 TC101 TYPICAL FACEPLATE LABELING

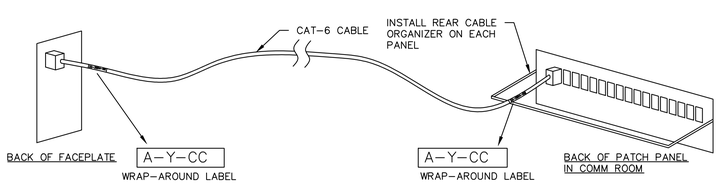


NOTES:
1. INSTALL A LABEL TO EACH PATCH PANEL DETAILING THE COMM ROOM NUMBER AND PATCH PANEL NUMBER. EACH PANEL IS PRE-NUMBERED 01-24 ON EACH PANEL.
2. ALL LABELS ADDED TO THE PANEL SHALL BE LASER PRINTED AND CUT TO FIT. ALL NUMBERS SHALL EXACTLY ALIGN WITH THE LOCATION ON THE PATCH PANEL.
3. IF THE PANEL IS NOT PRE-LABELED 01-24 THEN THE CONTRACTOR SHALL INSTALL A LABEL FOR EACH PORT.
4. INDIVIDUAL CABLES AT A SINGLE FACEPLATE SHALL BE LABELED IN SEQUENCE AS PER THE PATCH PANEL.
5. THE CABLES SHALL BE TERMINATED ON THE PATCH PANEL IN NUMERICAL ORDER. NO EXCEPTIONS.

DATA CABLE LABELING A-Y-CC

A = COMMUNICATIONS ROOM NUMBER. A, B OR C ETC.
Y = PATCH PANEL IN THAT COMMUNICATIONS ROOM
CC = PORT NUMBER ON PATCH PANEL 0-24.

4 TC101 CAT-6 DATA PANEL LABELING



NOTES:
1. INSTALL A WRAP-AROUND LABEL AT EACH END OF EACH CABLE.
2. WRAP-AROUND LABELS SHALL BE LASER-PRINTED AND SHALL BE SELF-LAMINATING.

CABLE LABEL:

A = COMMUNICATIONS ROOM NUMBER. A, B OR C ETC.
Y = PATCH PANEL IN THAT COMMUNICATIONS ROOM
CC = PORT NUMBER ON PATCH PANEL 0-24.
DDD = CAMERA OR WAP NUMBER

2 TC101 TYPICAL CABLE LABELING AT FACEPLATE & PATCH PANEL

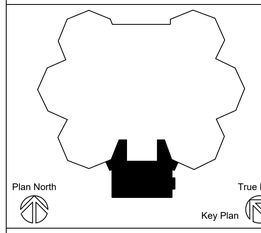
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ATTWOOD ELEMENTARY CAFETERIA ADDITION

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Date Revised	Description
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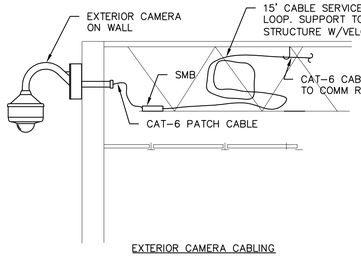
Project Manager	Discipline Lead
D EBERT	B EMERSON
Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
9/18/2023 BIDS & PERMITS	23005898A

Sheet Name

CABLING LEGENDS, SCHEDULES & DETAILS

Drawing Number

TC101



EXTERIOR CAMERA CABLING

4

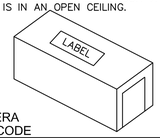
PARTS

QTY	DESCRIPTION	MANUFACTURER	PART #
1	SURFACE BOX	HUBBELL	HSB10W
1	CAT-6 CABLE-GREEN	MOHAWK	M58286
1	CAT-6 JACK	HUBBELL	HXJ6GN
1	PATCH CABLE	HUBBELL	HC6GN10

CONNECTIVITY CODE

INSTALLATION NOTES

1. PROVIDE A SURFACE MOUNT BOX TO THE BUILDING STRUCTURE NEAR THE SECURITY CAMERA LOCATION.
2. SEE CEILING PLAN FOR INSTALLATION. INSTALL CONDUIT AT LOCATIONS WHERE THE CAMERA IS IN AN OPEN CEILING.

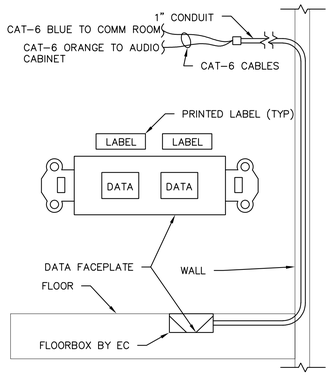


4 SECURITY CAMERA CONNECTIVITY CODE
TC102

INSTALLATION NOTES:

1. REFER TO THESE NOTES FOR ALL CONNECTIVITY CODES. FOR SPECIALIZED NOTES SEE THE ACTUAL CONNECTIVITY CODE.
2. ROUTE ALL USER CABLES FROM THE RACK OR CABINET, THROUGH THE CABLE TRAY IF SO PROVIDED. IF NO CABLE TRAY IS SHOWN INSTALL CABLES THROUGH "J" HOOKS. PROVIDE ALL "J" HOOKS.
3. CABLES SHALL BE SUPPORTED NO LESS THAN EVERY 5 FEET.
4. PROVIDE A SMALL LOOP OF CABLE ABOVE THE CEILING PRIOR TO INSTALLING THE CABLE INTO THE USER CONDUIT OR RACEWAY.
5. ROUTE THE CABLE THROUGH THE CONDUIT OR RACEWAY AND TO THE WALLBOX, FLOORBOX OR SURFACE MOUNT BOX. PROVIDE ENOUGH EXTRA CABLE FOR TERMINATION AND MAINTENANCE.
6. TERMINATE ALL CABLES WITH THE CORRECT CONNECTORS.
7. ALL CONNECTORS SHALL BE INSERTED INTO THE KEYSTONE PLATES AND THEN THE KEYSTONE PLATES SHALL BE INSTALLED INTO THE FACEPLATES.
8. INSTALL FACEPLATES TO THE BOXES OR DIRECTLY TO THE WALL OR FURNITURE IN THE CASE OF SURFACE MOUNT BOXES.
9. EACH CABLE SHALL HAVE A LASER-PRINTED, SELF-LAMINATING WRAP-AROUND LABEL AT EACH END. SEE DETAILS ON TC101
10. OUTLETS SHALL BE AT 18" AFF UNLESS NOTED ON THE CONNECTIVITY CODE OR PLAN DRAWINGS.
11. LABEL EACH FACEPLATE WITH A LASER-PRINTED LABEL THAT IS INSTALLED BEHIND THE CLEAR PLASTIC LABEL STRIP. WHERE NO LABEL STRIP IS PROVIDED, THE CONTRACTOR SHALL INSTALL A LASER PRINTED ADHESIVE LABEL. WHERE SPECIFICALLY NOTED, THE CONTRACTOR SHALL INSTALL ENGRAVED LAMACOID LABELS.
12. AFTER INSTALLATION, ALL CABLES SHALL BE TESTED. SEE SPECIFICATIONS FOR TESTING REQUIREMENTS.
13. FOR AUDIO AND VIDEO CONNECTIONS, THE CONTRACTOR SHALL ROUTE SIGNALS ACROSS THE CABLES FOR TESTING.
14. PROVIDE FLEXIBLE CONDUIT FROM THE WALLBOX OR FLOORBOX TO THE FURNITURE RACEWAY WHERE CABLES ARE INSTALLED IN FURNITURE.

N CONNECTIVITY CODE MOHAWK NOTE
TC102



5

PARTS

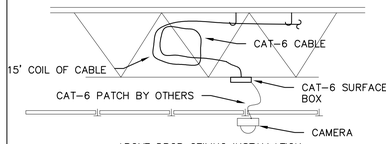
QTY	DESCRIPTION	MANUFACTURER	PART #
1	CAT-6 CABLES	MOHAWK	M58281
1	CAT-6 JACK	HUBBELL	HXJ60W
1	CAT-6 CABLES	MOHAWK	M58288
1	CAT-6 JACK	HUBBELL	HXJ60R
1	2-HOLE 106	HUBBELL	BR106C

CONNECTIVITY CODE

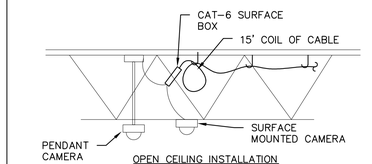
INSTALLATION NOTES:

1. INSTALL DATA CABLES FROM THE BACK OF FACEPLATE THROUGH RACEWAY & ABOVE DROP CEILING.
2. TERMINATE CABLES ON THE JACKS. INSTALL JACK INTO KEYSTONE. INSTALL KEYSTONE INTO FACEPLATE.
3. EACH CABLE SHALL BE LABELED AT EACH END WITH A LASER PRINTED WRAP AROUND LABEL.
4. FLOORBOX IS BY E.C.

5 CONNECTIVITY CODE
TC102



ABOVE DROP CEILING INSTALLATION



OPEN CEILING INSTALLATION

SECURITY CAMERA

1

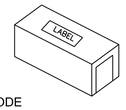
PARTS

QTY	DESCRIPTION	MANUFACTURER	PART #
1	SURFACE BOX	HUBBELL	HSB10W
1	CAT-6 CABLES-GREEN	MOHAWK	M58286
1	CAT-6 JACK	HUBBELL	HXJ6GN

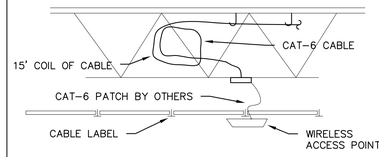
CONNECTIVITY CODE

INSTALLATION NOTES:

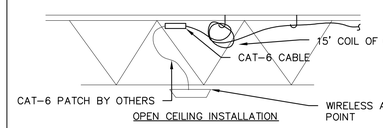
1. PROVIDE A SURFACE MOUNT BOX TO THE BUILDING STRUCTURE NEAR THE SECURITY CAMERA LOCATION.
2. SEE FLOORPLAN FOR LOCATION.
3. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR TYPE



1 CONNECTIVITY CODE
TC102



ABOVE DROP CEILING INSTALLATION



OPEN CEILING INSTALLATION

WIRELESS ACCESS POINT, CAT-6

2

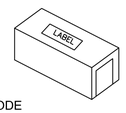
PARTS

QTY	DESCRIPTION	MANUFACTURER	PART #
1	SURFACE BOX	HUBBELL	HSB10W
1	CAT-6 CABLES-YELLOW	MOHAWK	M58283
1	CAT-6 JACK	HUBBELL	HXJ6Y

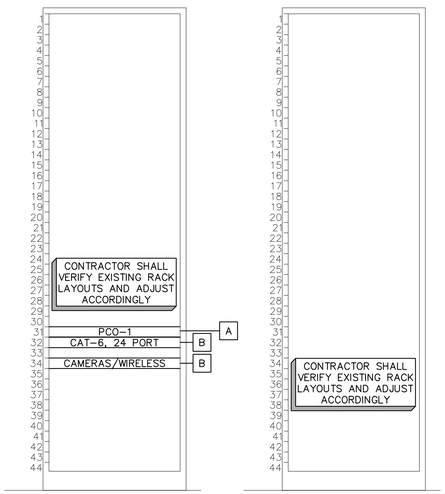
CONNECTIVITY CODE

INSTALLATION NOTES:

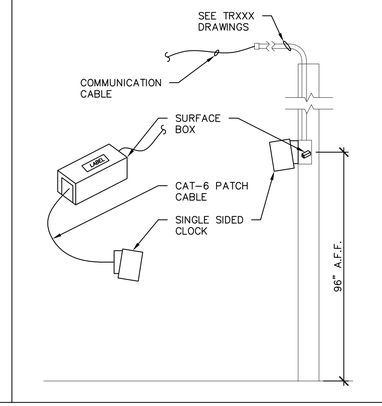
1. PROVIDE A SURFACE MOUNT BOX TO THE BUILDING STRUCTURE NEAR THE ACCESS POINT LOCATION.
2. SEE FLOORPLAN FOR LOCATION.
3. SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR TYPE
4. INSTALL A LASER PRINTED CABLE LABEL ON THE CEILING WHERE THE CABLE TERMINATES. THIS WILL ALLOW THE FUTURE USER TO FIND THE CABLE TO EVENTUALLY INSTALL WIRELESS ACCESS POINT.



2 CONNECTIVITY CODE
TC102



6 COMM ROOM MDF RACK LAYOUT
TC102



3

PARTS

QTY	DESCRIPTION	MANUFACTURER	PART #
1	SURFACE BOX	HUBBELL	HSB10W
1	CAT-6 CABLE	MOHAWK	M58281
1	CAT-6 JACK	HUBBELL	HXJ60W
1	IP CLOCK	SAPLING	SBP-31S-404-OG

CONNECTIVITY CODE

NOTES:

1. IF NO CONDUIT EXISTS, FISH WALL.
2. INSTALL IN BACKBOX OR ABOVE CEILING.

3 CONNECTIVITY CODE
TC102

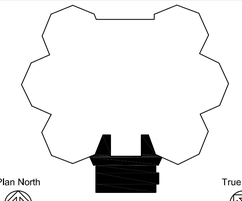
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ATTWOOD ELEMENTARY CAFETERIA ADDITION

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LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	B EMERSON
Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
9/18/2023 BIDS & PERMITS	23005898A

Sheet Name

CABLING CONNECTIVITY CODES

Drawing Number

TC102

AUDIO VIDEO SYMBOL LEGEND

SYMBOL	DESCRIPTION
⟨1⟩	THIS SYMBOL WITH A NUMBER INSIDE REFERS TO KEYNOTES. REFER TO NOTES ON THE SHEET FOR ADDITIONAL INFORMATION
A	EQUIPMENT SCHEDULE. THIS SYMBOL WITH LETTERS INSIDE REFERS EQUIPMENT SCHEDULES, SEE DETAILS AND EQUIPMENT SCHEDULES ON TC101, TC301, TC501 AND TC701.
1	CABLE SCHEDULE. THIS SYMBOL WITH NUMBERS INSIDE REFERS EQUIPMENT SCHEDULES, SEE DETAILS AND EQUIPMENT SCHEDULES ON TC101, TC301, TC501 AND TC701.
◇ZZ	AUDIO/VIDEO COMMUNICATIONS OUTLET. REFER TO THE ASSOCIATED AV SYSTEM DETAIL FOR REQUIREMENTS. ZZ REFERS TO HEIGHT OF OUTLET. 18" UNLESS OTHER WISE NOTED.
SEE TC3XX/X	AV SYSTEM DETAIL. REFER TO THIS SHEET AND DETAIL NUMBER FOR THE REQUIREMENTS OF THE AUDIO/VIDEO SYSTEM IN THIS ROOM
(S)X	SPEAKERS. SEE SPEAKER SCHEDULE ON TC301."X" REFERS TO SPEAKER TYPE. "ZZ" REFERS TO SPEAKER ZONE IF THIS IS A PAGING SPEAKER.

ABBREVIATIONS

ABBREV.	DESCRIPTION	ABBREV.	DESCRIPTION
2G	TWO-GANG BOX - PROVIDED BY EC	NIC	NOT IN CONTRACT
AC	ABOVE COUNTER - INSTALL BACKBOX SAME HEIGHT AS OTHER ELECTRICAL OUTLETS ABOVE THE COUNTER.	PBO	PROVIDED BY OTHERS
AFF	ABOVE FINISHED FLOOR	PCO-1	PATCH CORD ORGANIZER - 1 UNIT HIGH
AFG	ABOVE FINISHED GROUND	PCO-2	PATCH CORD ORGANIZER - 2 UNITS HIGH
AWG	AMERICAN WIRE GAUGE	PET	PROTECTED ENTRANCE TERMINAL
EMT	EMT TYPE CONDUIT	QTY	QUANTITY
EC	ELECTRICAL CONTRACTOR		

AUDIO/VIDEO CABLE SCHEDULE

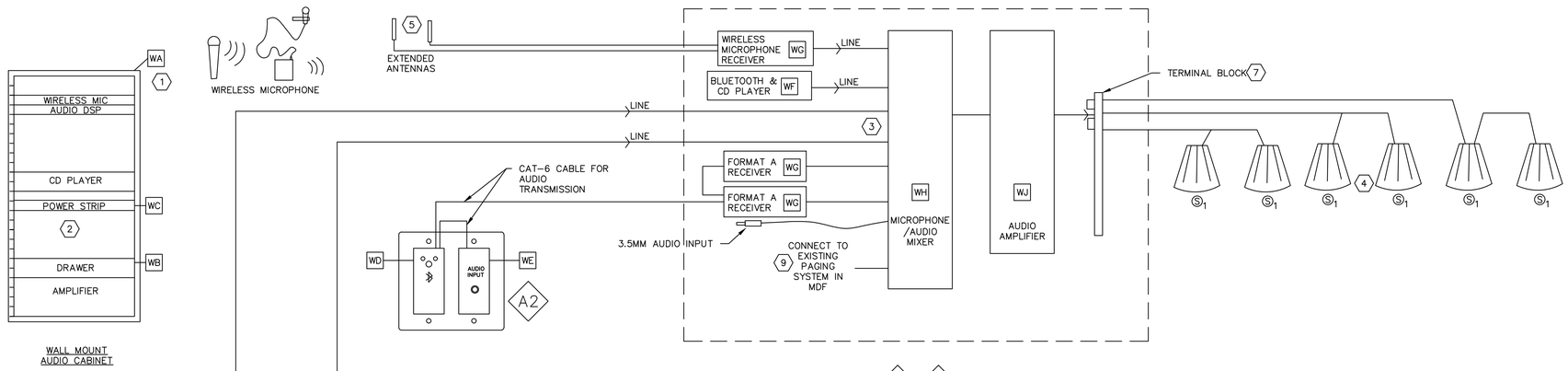
MARK	DESCRIPTION	MANUFACTURER	PART NO.
31	MIC/LINE LEVEL CABLE, 24 AWG. DIGITAL-PLENUM	BELDEN	1801B
32	18 AWG TWISTED PAIR DISTRIBUTED SPEAKER CABLE -PLENUM	WEST PENN	25224B
33	14 AWG TWISTED PAIR DISTRIBUTED SPEAKER CABLE -PLENUM	WEST PENN	25226B
34	12 AWG TWISTED PAIR DISTRIBUTED SPEAKER CABLE -PLENUM	WEST PENN	25227B
35	HDMI CABLE. ACTIVE FOR SIGNAL LENGTHS LONGER THAN 35' PLENUM RATED	HALL RESEARCH	CONTRACTOR
36	RS-232 CONTROL CABLE -PLENUM OR RISER DEPENDING UPON INSTALL LOCATION	WEST PENN	CONTRACTOR
37	CAT-6 UTP CABLES FOR USB CONNECTIVITY SHALL BE ORANGE IN COLOR	MOHAWK	M58288
38	CAT-6 SHIELDED, PLENUM, RED FOR VIDEO TRANSMISSION	MOHAWK	CONTRACTOR
39	CONTROL CABLE FOR RS-232 AND/OR IR. 3-CONDUCTOR SHIELDED -PLENUM	WEST PENN	CONTRACTOR

SPEAKER SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	PART NO.
(S)1	OPEN CEILING PENDANT TYPE SPEAKER. PROVIDE AIRCRAFT CABLE/CHAIN TO SUPPORT SPEAKER FROM BLDG STRUCTURE. COORDINATE HEIGHT WITH DESIGNER	ATLAS IED	PM8CX-WH

AUDIO EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	PART NO.
WA	WALL MOUNT CABINET, 24"X30"X48" WITH CENTER SWING-OUT. SEE SPECS	HOFFMAN	EWMWG362425
WB	DRAWER FOR STORING MISCELLANEOUS AUDIO & VIDEO MATERIAL. 3 RU W/LOCK	LOWELL	UDEL-314
WC	POWER STRIP	SURGEX	SX1120RT
WD	BLUETOOTH EXTENDER AND RECEIVER	RDL	D-BTIA WITH RCVR #TX-TPR1A
WE	LINE LEVEL EXTENDER FACEPLATE. 3.5MM AUDIO INPUT	RDL	D-TPS8A
WF	CD PLAYER WITH BLUETOOTH CONNECTIVITY	TASCAM	CD-200BT
WG	WIRELESS MICROPHONE WITH (HANDHELD) (LAVALIER) (HEADWORN) MIC	AUDIX	R41/2 RECEIVER HANDHELD MIC #H60 BODYPACK #B60 LAVALIER MIC #L5
WH	AUDIO MIXER 8-PORT	ROLLS	RM82
WJ	AUDIO AMPLIFIER	QSC	SPA OR ISA SERIES



A1 A3

PARTS — CONNECTIVITY CODE

QTY	DESCRIPTION	MANUFACTURER	PART #
1	CUSTOM 1-GANG PLATE EQUIPPED WITH:		
1	3-PIN XLR PASS THRU		
1	MICROPHONE CABLE		
CABLES AS REQUIRED			

NOTES:

1. PROVIDE AND INSTALL A NEW AUDIO SYSTEM IN THE CAFETERIA. INSTALL THE CABINET, AUDIO SYSTEM AND CABLING.
2. CONTRACTOR SHALL PROVIDE AMPLIFIERS REQUIRED TO DRIVE THE AUDIO SYSTEM.
3. LABEL ALL CONNECTION CABLES AT EACH END WITH PRE-PRINTED LABELS.
4. CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND TEST THE SYSTEM. USE A LIFT TO TEST EACH SPEAKER. CLEAN ALL CONNECTIONS.
5. FULLY CONFIGURE THE SYSTEM FOR OPTIMUM AUDIO.

KEYED NOTES:

⟨1⟩ PROVIDE AND INSTALL A NEW CABINET FOR THE AUDIO SYSTEM.

⟨2⟩ INSTALL A BLANK PANEL AND MOUNT THE NOTED EQUIPMENT TO THE PLATE. CUSTOM CUT THESE INTO THE PANEL.

⟨3⟩ LABEL EACH INPUT FOR THE INPUT TO WHICH IT CONNECTS

⟨4⟩ TEST EACH SPEAKERS BEFORE AND AFTER SYSTEM INSTALLATION.

⟨5⟩ INSTALL WIRELESS MIC ANTENNAS IN THE CEILING OF THE CAFETERIA. PROVIDE CABLING TO ANTENNAS

⟨6⟩ CUSTOM CONFIGURE THE TOUCHPANEL TO FULLY CONTROL THE AV SYSTEM. CONTROL ON/OFF, SETTINGS OF AUDIO AND INPUT OPTIONS. INSTALL OVERALL VOLUME LEVEL AND INDIVIDUAL INPUT VOLUME. CREATE A "BACK TO STANDARD" BUTTON THAT RESETS ALL INPUT AND OUTPUT LEVELS TO STANDARD SETTINGS

⟨7⟩ INSTALL A TERMINAL STRIP. TERMINATE SPEAKER CABLES. LABEL ALL SPEAKERS CABLES ON EACH SIDE OF THE TERMINAL STRIP

⟨8⟩ PROVIDE CUSTOM MOUNTING OF SPEAKERS FROM BUILDING STRUCTURE.

⟨9⟩ INSTALL A CONNECTION FOR THE AUDIO SYSTEM IN THIS ROOM TO PLAY THE PAGING SYSTEM MESSAGES FROM THE EXISTING PAGING SYSTEM. EXTEND A LINE LEVEL AUDIO SIGNAL FROM THE MDF PAGING SYSTEM TOT THIS MIXER. SET SYSTEM TO ALWAYS PLAY THE PAGES.

1 TC103 NEW CAFETERIA AUDIO SYSTEM SCHEMATIC

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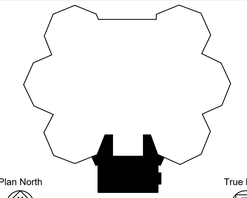
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Project Manager	Discipline Lead
D EBERT	B EMERSON
Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
9/18/2023 BIDS & PERMITS	23005898A

Sheet Name

AUDIO LEGENDS, SCHEDULES & DETAILS

Drawing Number

TC103

VIDEO SECURITY EQUIPMENT SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	PART NO.
SA	VIDEO SECURITY NVR SERVER AND RECORDING SOFTWARE. PROVIDE AND INSTALL A SERVER OR SERVERS WITH THE PROCESSING AND STORAGE TO MEET THE OWNERS NEED AS DETAILED ON THE DRAWINGS AND SPECS.	SEE SPECS	SEE SPECS
SB	INTERIOR IP CAMERA. 1080P RESOLUTION. PROVIDE WITH FLUSH CEILING, SURFACE CEILING, WALL OR PENDANT MOUNT BASED ON THE INSTALLATION TYPE REQUIRED. –OBJECT ANALYTIC, INTEGRATED WITH THE VMS FOR DETECTING AND SEARCHING BASED UPON SPECIFICS SUCH AS PERSON/VEHICLE/COLOR OF CLOTHES AND COLOR OF VEHICLE	AXIS	P3265–LV
SC	EXTERIOR IP CAMERA. PROVIDE WITH CEILING, WALL OR PENDANT MOUNT BASED ON THE INSTALLATION TYPE REQUIRED.	AXIS	P3265–LVE
SD	360 DEGREE CAMERA –SINGLE IMAGER.	AXIS	M4318–PLVE
SE	270 DEGREE CAMERA WITH DOWN COVERAGE –FOUR (4) SEPARATE IMAGERS. 270 COVERAGE WITH A DOWNARDS FACING CMAERA. INDOOR/OUTDOOR. –OBJECT ANALYTIC, INTEGRATED WITH THE VMS FOR DETECTING AND SEARCHING BASED UPON SPECIFICS SUCH AS PERSON/VEHICLE/COLOR OF CLOTHES AND COLOR OF VEHICLE	AXIS	P3727–PLE

ACCESS CONTROL EQUIPMENT SCHEDULE

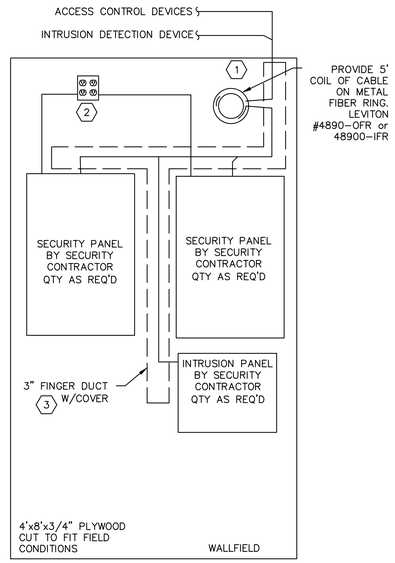
MARK	DESCRIPTION	MANUFACTURER	PART NO.
CA	ACCESS CONTROL SYSTEM, SOFTWARE AND ASSOCIATED/REQUIRED SERVERS	SEE SPECS	SPECS
CB	ACCESS CONTROL ENCLOSURE. BACKPLATE AND LOCKABLE PANEL	ALTRONIX	TROVE 1/2/3
CC	POWER SUPPLY FOR ACCESS CONTROL EQUIPMENT. EQUIP WITH ETHERNET CONNECTIVITY MODULE	ALTRONIX	E–FLOW SERIES W/ LINQ2 ENET MOD.
CD	POWER DISTRIBUTION BOARD AND VOLTAGE REGULATOR. POWERS OTHER BOARDS IN THE ACCESS CTRL PANEL	ALTRONIX	PDS8 SERIES WITH VR6 REGULATOR
CE	ACCESS POWER CONTROLLER	ALTRONIX	ACMS8 OR EQUAL
CF	DOOR ACCESS CONTROL MODULE. IP ATTACHED. QTY AS REQUIRED	MERCURY	LP SERIES OR EQUAL
CG	DOOR ACCESS CONTROL MODULE. RS–485 ATTACHED. QTY AS REQUIRED	MERCURY	MR SERIES OR EQUAL
CH	BATTERY FOR ACCESS CONTROL PANEL	SEE SPECS	SEE SPECS

SECURITY PANEL WALLFIELD NOTES:

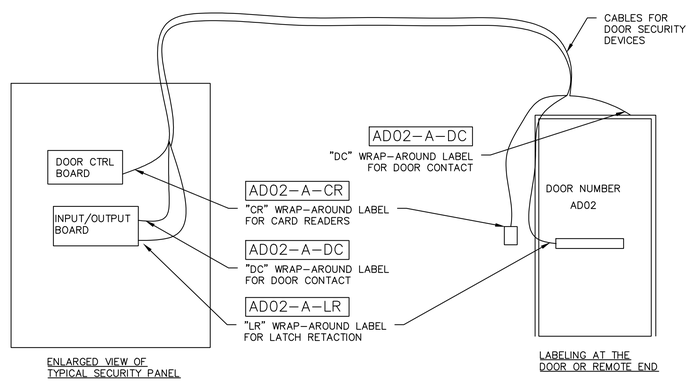
1. PLYWOOD SHALL BE INSTALLED ON THE WALL BEHIND THE PANELS AND RACEWAYS.
2. PLYWOOD SHALL BE FIREPROOF. A/C GRADE. C SIDE TO THE WALL.
3. INSTALL "FINGER–DUCT" TYPE RACEWAY OR D–RINGS TO ROUTE THE CABLES FROM THE CEILING TO THE PANELS.
4. MOUNT THE PANELS SO THAT THE TOP OF THE PANELS IS ABOUT 6' AFF.
5. CONNECT SECURITY PANELS TO A GROUND BAR. PROVIDE GROUND BAR ON THE WALLFIELD.

KEYED NOTES:

1. PROVIDE 5' OF CABLE PRIOR TO TERMINATION IN THE SECURITY PANEL. PROVIDE ON A FIBER OPTIC METAL RING. INSTALL ABOVE THE PANELS. PROVIDE ONE FOR EACH PANEL. GROUP PANEL CABLES ONTO PANEL SPECIFIC RING.
2. EXTEND 120V POWER TO THE POWER SUPPLIES IN THE PANELS. HARDWIRE ALL CONNECTIONS. PROVIDE CONDUIT AND WIRING FROM CLOSEST CIRCUIT.
3. PROVIDE SUPPORT FOR THE CABLES WITH "FINGER–DUCT" OR OTHER RACEWAY.



2 TYPICAL SECURITY WALLFIELD
TC104
NO SCALE



AD02 = DOOR NUMBER AS SHOWN ON DRAWINGS
A = COMM ROOM WHERE PANEL RESIDES
LR = TWO LETTER DESIGNATION FOR DEVICE THAT THE CABLE CONNECTS TO.

NOTES:
1. INSTALL A WRAP–AROUND LABEL AT EACH END OF EACH CABLE.
2. WRAP–AROUND LABELS SHALL BE LASER–PRINTED AND BE SELF–LAMINATING.
3. AT THE PANEL THE CABLE SHALL BE LABELED AS IT CONNECTS TO THE PANEL. LABEL INDIVIDUAL SHEATHED CABLES IN A MULTI–SERVICE CABLE.
4. AT THE DOOR INSTALL THE LABEL AT THE DEVICE WHERE IT IS CONNECTED.

1 TYPICAL ACCESS CONTROL CABLE LABELING
TC104

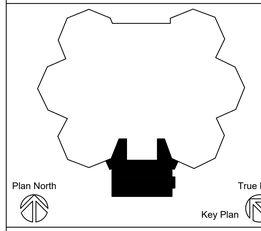
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Project Manager	Discipline Lead
D EBERT	B EMERSON
Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
9/18/2023 BIDS & PERMITS	23005898A

Sheet Name

SECURITY LEGENDS, SCHEDULES & DETAILS

Drawing Number

TC104

OPERATION SEQUENCE WHEN THE DOORS ARE LOCKED ENTERING FROM OUTSIDE –VALID ID CARD

1. IF THE PERSON PRESENTS A VALID CARD THEN THE LATCH SHALL RETRACT INSIDE THE EXTERIOR DOOR
.
2. THE SECURITY SYSTEM SHALL ALLOW THE EXTERIOR PUSH BUTTON TO BE ENERGIZED. ONCE THE PUSH BUTTON IS ENERGIZED THEN THE EXTERIOR DOOR SHALL BE OPENED OF THE BUTTON IS PUSHED.

3. THE EXTERIOR AUTO OPENER CONTROL BOARD SHALL COMMUNICATE TO THE CONTROL BOARD OF THE INTERIOR DOOR AND THAT DOOR SHALL OPEN.

OPERATION SEQUENCE WHEN THE DOORS ARE UNLOCKED ENTERING FROM OUTSIDE

1. THE LATCH BOLT MONITOR SHALL NOTE THAT THE LATCH IS RETRACTED AND SHALL COMMUNICATE THAT INFORMATION TO THE CONTROL BOARD IN THE AUTO OPENER.

2. THE CONTROL BOARD SHALL ALLOW THE EXTERIOR PUSH BUTTON TO BE ENERGIZED. ONCE THE PUSH BUTTON IS ENERGIZED THEN THE EXTERIOR DOOR SHALL BE OPENED OF THE BUTTON IS PUSHED.

3. THE EXTERIOR AUTO OPENER CONTROL BOARD SHALL COMMUNICATE TO THE CONTROL BOARD OF THE INTERIOR DOOR AND THAT DOOR SHALL OPEN.

OPERATION SEQUENCE WHEN THE DOORS ARE LOCKED ENTERING FROM OUTSIDE –NO CARD OR INVALID CARD

1. IF THE PERSON PUSHES THE EXTERIOR OPENER BUTTON THEN THE AUTO OPENER SHALL NOT ENGAGE BECAUSE THE OPENER BUTTON IS NOT ENERGIZED.

2. THE EXTERIOR OPENER BUTTON IS NOT ENERGIZED UNLESS THE LATCH BOLT MONITOR NOTES THAT THE LATCH IS RETRACTED.

OPERATION SEQUENCE WHEN THE DOORS ARE LOCKED, EXITING FROM INTERIOR

1. WHEN A PERSON PUSHES THE INTERIOR OPENER BUTTON THEN THAT SHALL COMMUNICATE WITH THE INTERIOR AUTO OPENER AND OPEN THAT DOOR.

2. THE CONTROL BOARD OF THE INTERIOR AUTO OPENER SHALL COMMUNICATE WITH THE CONTROL BOARD OF THE EXTERIOR AUTO OPENER AND NOTE THAT THE INTERIOR OPENER BUTTON HAS BEEN PRESSED.

3. THE CONTROL BOARD OF THE EXTERIOR AUTO OPENER SHALL COMMUNICATE WITH THE ACCESS CONTROL SYSTEM AND INSTRUCT IT TO RETRACT THE LATCH ON THE EXTERIOR DOOR.

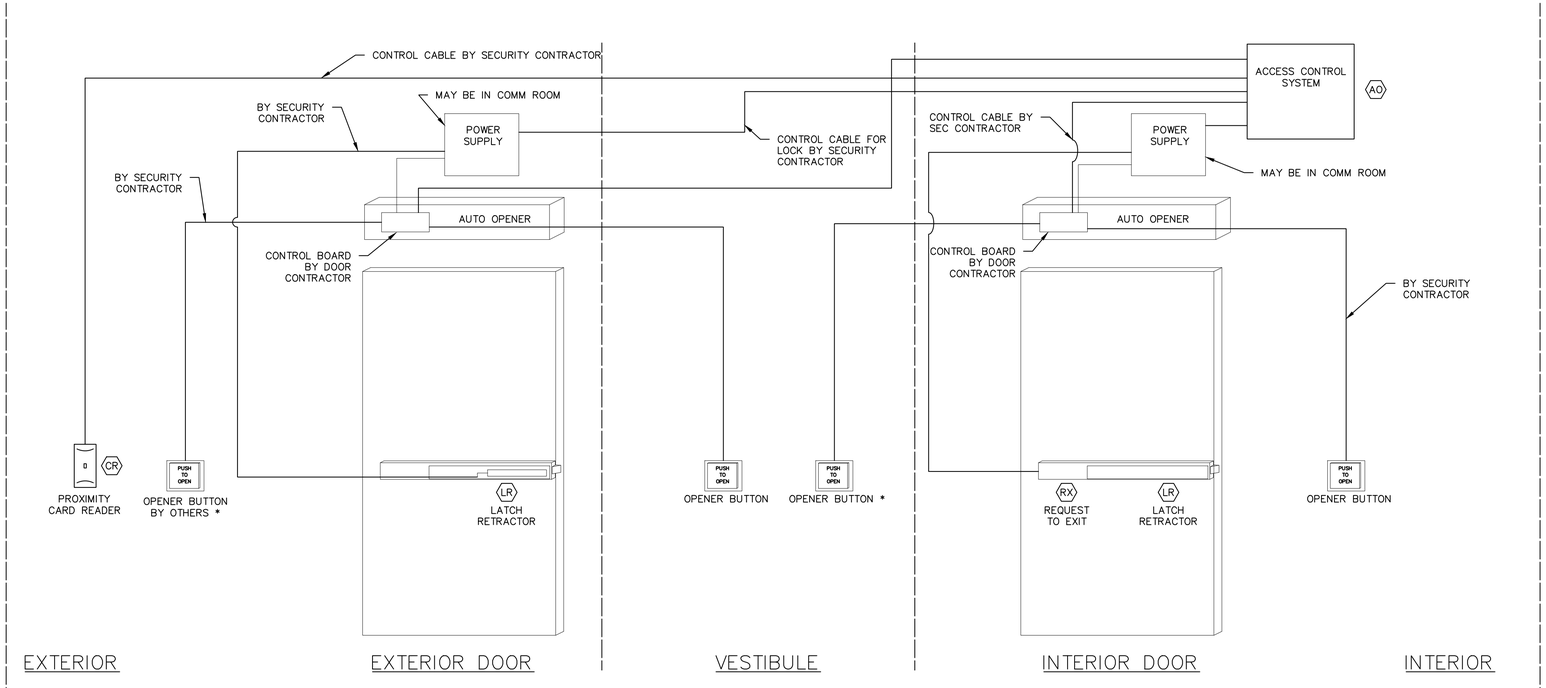
4. THE EXTERIOR CONTROL BOARD SHALL WAIT A SET NUMBER OF SECONDS AND THEN IT SHALL ENGAGE THE EXTERIOR AUTO OPENER TO OPEN THE EXTERIOR DOOR.

OPERATION SEQUENCE WHEN THE DOORS ARE LOCKED, EXITING FROM VESTIBULE

1. WHEN A PERSON PUSHES THE VESTIBULE OPENER BUTTON THEN THAT SHALL COMMUNICATE WITH THE INTERIOR AUTO OPENER AND OPEN THAT DOOR. IT SHALL ALSO COMMUNICATE WITH THE CONTROL BOARD OF THE EXTERIOR AUTO OPENER.

2. THE CONTROL BOARD OF THE EXTERIOR AUTO OPENER SHALL COMMUNICATE WITH THE ACCESS CONTROL SYSTEM AND INSTRUCT IT TO RETRACT THE LATCH ON THE EXTERIOR DOOR.

3. THE EXTERIOR CONTROL BOARD SHALL WAIT A SET NUMBER OF SECONDS AND THEN IT SHALL ENGAGE THE EXTERIOR AUTO OPENER TO OPEN THE EXTERIOR DOOR.
4.



TYPICAL DEVICE CONNECTIVITY

GENERAL NOTE:

* THE OUTSIDE OPENER BUTTON WILL BE ENABLED & DISABLED BY THE ACCESS CONTROL SYSTEM. THE BUTTONS WILL BE ENABLED WHEN THE DOOR IS UNLOCKED.

1 TC105 ADA DOOR OPENER & ACCESS CONTROL INTEGRATION DIAGRAM

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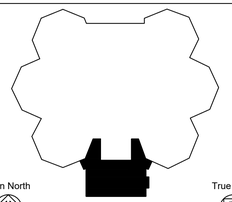
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Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
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Sheet Name

SECURITY EQUIPMENT DETAILS

Drawing Number

TC105

GENERAL NOTES:

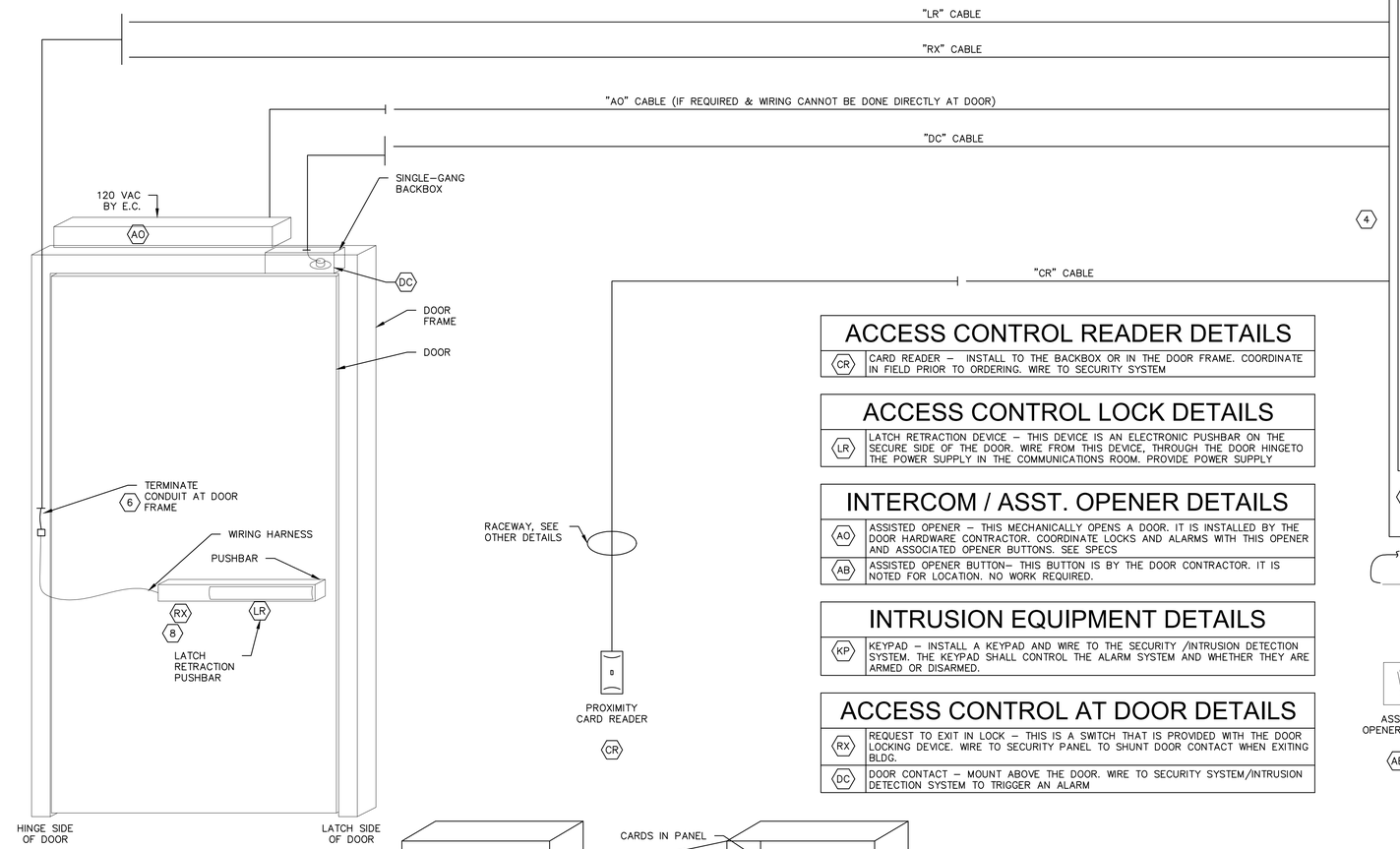
1. SEE OTHER DETAILS FOR RACEWAY REQUIREMENTS FOR ALL CABLING AND DEVICES. REFER TO THE PLAN DRAWINGS FOR THE SPECIFIC FIELD DEVICE AND WHERE IT IS TO BE INSTALLED.
2. AT SOME LOCATIONS THE CARD READER WILL HAVE TO BE INSTALLED INTO THE DOOR FRAME. PROVIDE A FRAME TYPE READER AT THESE LOCATIONS. VERIFY PRIOR TO ORDERING EQUIPMENT.
3. ALL SECURITY DEVICES SHALL BE WIRED DIRECTLY BACK TO THE SECURITY SYSTEM (ACCESS CONTROL) PANELS OR INTRUSION DETECTION PANEL. LOCATE PANELS ON THE WALLS OF COMMUNICATIONS ROOMS OR AS SHOWN ON THE FLOOR PLANS. SEE OTHER DETAILS FOR MOUNTING AND RACEWAY REQUIREMENTS FOR CABLING.
4. PROVIDE ALL SECURITY CABLES AND ALL SECURITY PANELS REQUIRED FOR CONNECTIVITY OF THE SYSTEM. SHALL BE PLENUM RATED IN PLENUM AREAS.
5. LABEL THE OUTSIDE OF THE PANEL FOR THE DOORS AND DEVICES THAT ARE CONNECTED INSIDE THE PANEL. PROVIDE A PANEL DIAGRAM INSIDE THE PANEL THAT SHOWS THE CARDS AND WHAT IS CONNECTED TO EACH PORT ON THE CARDS.
6. PROVIDE MAGNETIC CABLE SUPPORTS THROUGHOUT THE PANEL FOR SUPPORT OF CABLES AS THEY ROUTE BETWEEN CARDS IN THE PANEL.
7. INCLUDE NYLON OR PLASTIC GROMMETS IN THE PANELS WHERE CABLES ROUTE INTO THE PANELS.
8. CONNECT BATTERIES TO THE PANEL TO SUPPORT THE PANEL AND DEVICES FOR A SHORT POWER OUTAGE.

KEYED INTRUSION DETECTION NOTES:

21. PROVIDE AN INTRUSION DETECTION PANEL THAT CONNECTS TO THE VARIOUS MONITORING DEVICES IN THE SYSTEM. ENTER THE USERS INFORMATION FOR THE ALARM SYSTEM.
22. INSTALL A KEYPAD AND CONNECT TO THE INTRUSION PANEL. SET THIS UP FOR ARMING AND DISARMING AND REPORTING OF ZONES AND SYSTEM ALARMS.
23. PROVIDE A POWER SUPPLY TO SUPPORT THE INTRUSION DETETCTION AND ALL END USER DEVICES SUCH AS MOTIONS, DOOR CONTACTS ETC.
24. INSTALL A DIALER TO THE SYSTEM SO THAT IN AN ALARM THE SYSTEM WILL CALL THE THIRD PARTY CENTRAL STATION.
25. AFFIX A CUSTOM SHEET OF PAPER INSIDE THE PANEL DOOR THAT SHOWS WHAT DOORS OR DEVICES ARE CONNECTED TO EACH PANEL. LAMINATE OR INSTALL IN A PLASTIC SLEEVE.
26. CUT HOLE IN PANEL TO SUPPORT CABLE INSTALLATION. INSTALL A NYLON OR PLASTIC GROMMET IN THE PANEL.
27. CONNECT ALL CABLES AND DEVICES TO THE BOARDS WITHIN THE PANEL THAT IS REQUIRED FOR CONNECTIVITY AND SYSTEM OPERATION.

KEYED ACCESS CONTROL NOTES:

1. CONTRACTOR SHALL EXTEND POWER FROM EXISTING OUTLET TO THE POWER SUPPLIES ON THE WALL/IN THE PANEL. PROVIDE ALL RACEWAY AND WIRING FOR EXTENSION OF POWER. MAKE ALL CONNECTIONS
2. PROVIDE A POWER SUPPLY TO SUPPORT THE SECURITY PANELS AND ALL END USER DEVICES SUCH AS LOCKS, STROBES, REQUEST TO EXIT DEVICES, ALARMS ETC.
3. AFFIX A CUSTOM SHEET OF PAPER INSIDE THE PANEL DOOR THAT SHOWS WHAT DOORS OR DEVICES ARE CONNECTED TO EACH PANEL. LAMINATE OR INSTALL IN A PLASTIC SLEEVE.
4. CUT HOLE IN PANEL TO SUPPORT CABLE INSTALLATION. INSTALL A NYLON OR PLASTIC GROMMET IN THE PANEL.
5. CONNECT ALL CABLES AND DEVICES TO THE CONTROLLERS/BOARDS WITHIN THE PANEL THAT IS REQUIRED FOR CONNECTIVITY AND SYSTEM OPERATION. PROVIDE A COIL OF 5' OF CABLE ABOVE THE PANEL ON THE WALL.
6. FOR AN LR DEVICE THE DOOR HARDWARE SUPPLIER WILL PROVIDE A WIRING HARNESS FROM THE LOCK THROUGH THE HINGE AND INTO THE DOOR FRAME. SECURITY CONTRACTOR TO WIRE FROM PANEL OR POWER SUPPLY TO THE WIRING HARNESS.
7. INSTALL A CAT-6 CABLE FROM THIS LOCATION TO THE PATCH PANEL IN THE RACK IN THE COMM ROOM. CABLE AND JACKS SHALL BE PURPLE. TERMINATE WITH A CAT-6 MODULAR JACK AT EACH END.
8. CONNECT TO THE REQUEST TO EXIT (RX) TO SHUNT ALARM. SHALL BE MOUNTED TO THE SECURE SIDE OF THE DOOR.



ACCESS CONTROL READER DETAILS

CR	CARD READER – INSTALL TO THE BACKBOX OR IN THE DOOR FRAME. COORDINATE IN FIELD PRIOR TO ORDERING. WIRE TO SECURITY SYSTEM

ACCESS CONTROL LOCK DETAILS

LR	LATCH RETRACTION DEVICE – THIS DEVICE IS AN ELECTRONIC PUSHBAR ON THE SECURE SIDE OF THE DOOR. WIRE FROM THIS DEVICE, THROUGH THE DOOR HINGETO THE POWER SUPPLY IN THE COMMUNICATIONS ROOM. PROVIDE POWER SUPPLY

INTERCOM / ASST. OPENER DETAILS

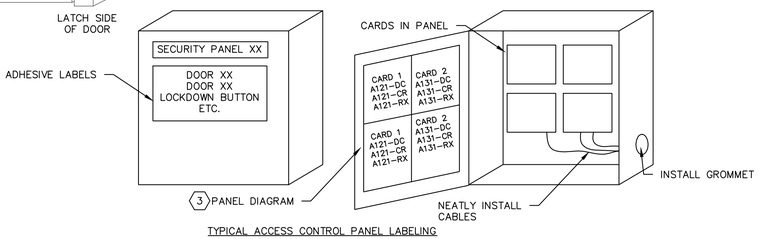
AO	ASSISTED OPENER – THIS MECHANICALLY OPENS A DOOR. IT IS INSTALLED BY THE DOOR HARDWARE CONTRACTOR. COORDINATE LOCKS AND ALARMS WITH THIS OPENER AND ASSOCIATED OPENER BUTTONS. SEE SPECS
AB	ASSISTED OPENER BUTTON– THIS BUTTON IS BY THE DOOR CONTRACTOR. IT IS NOTED FOR LOCATION. NO WORK REQUIRED.

INTRUSION EQUIPMENT DETAILS

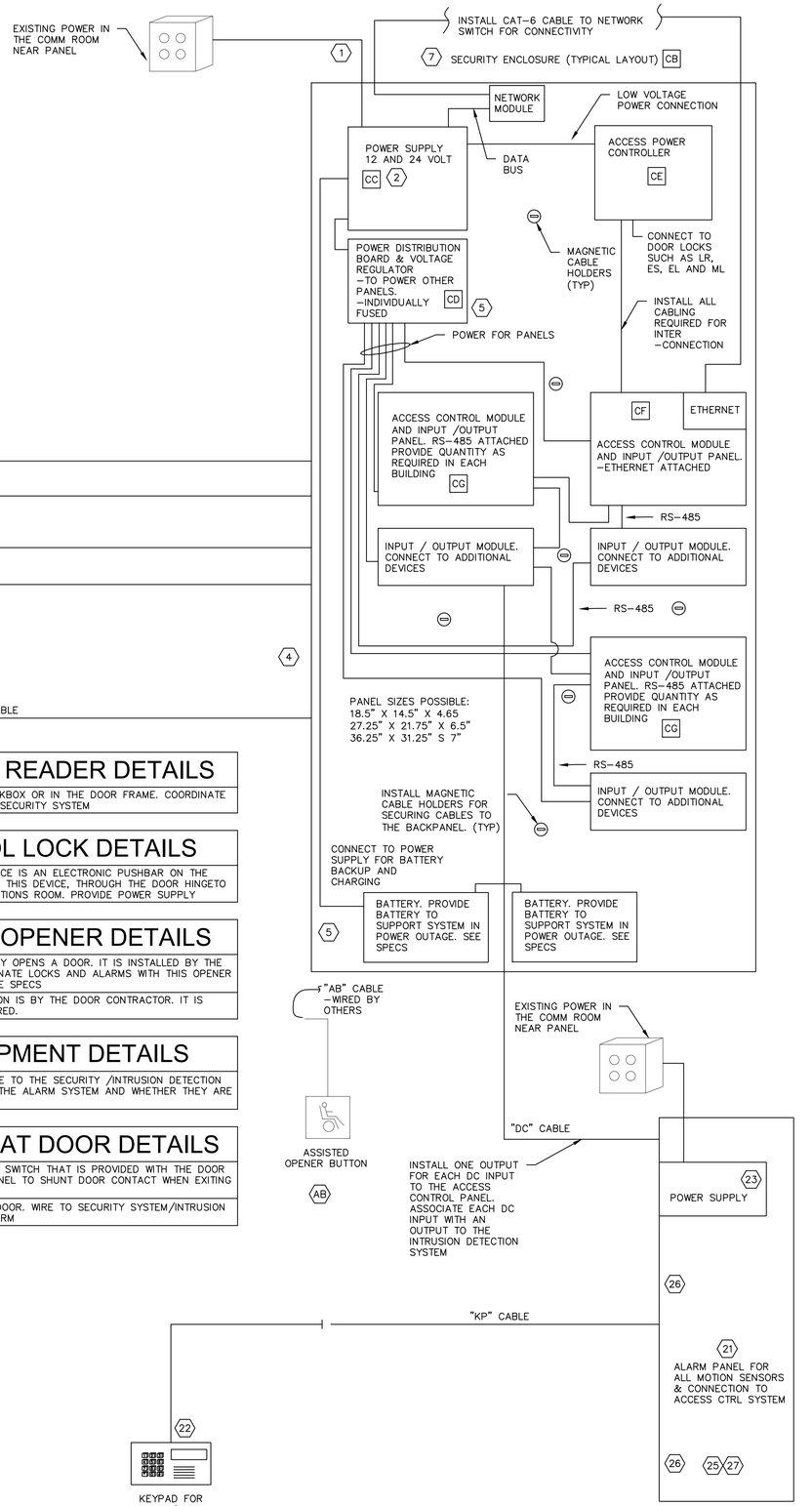
KP	KEYPAD – INSTALL A KEYPAD AND WIRE TO THE SECURITY /INTRUSION DETECTION SYSTEM. THE KEYPAD SHALL CONTROL THE ALARM SYSTEM AND WHETHER THEY ARE ARMED OR DISARMED.

ACCESS CONTROL AT DOOR DETAILS

RX	REQUEST TO EXIT IN LOCK – THIS IS A SWITCH THAT IS PROVIDED WITH THE DOOR LOCKING DEVICE. WIRE TO SECURITY PANEL TO SHUNT DOOR CONTACT WHEN EXITING BLDG.
DC	DOOR CONTACT – MOUNT ABOVE THE DOOR. WIRE TO SECURITY SYSTEM/INTRUSION DETECTION SYSTEM TO TRIGGER AN ALARM



TYPICAL ACCESS CONTROL PANEL LABELING



1 TC106 DOOR HARDWARE & SECURITY EQUIPMENT CONNECTIVITY REQUIREMENTS

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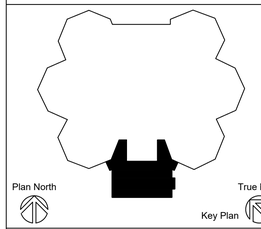
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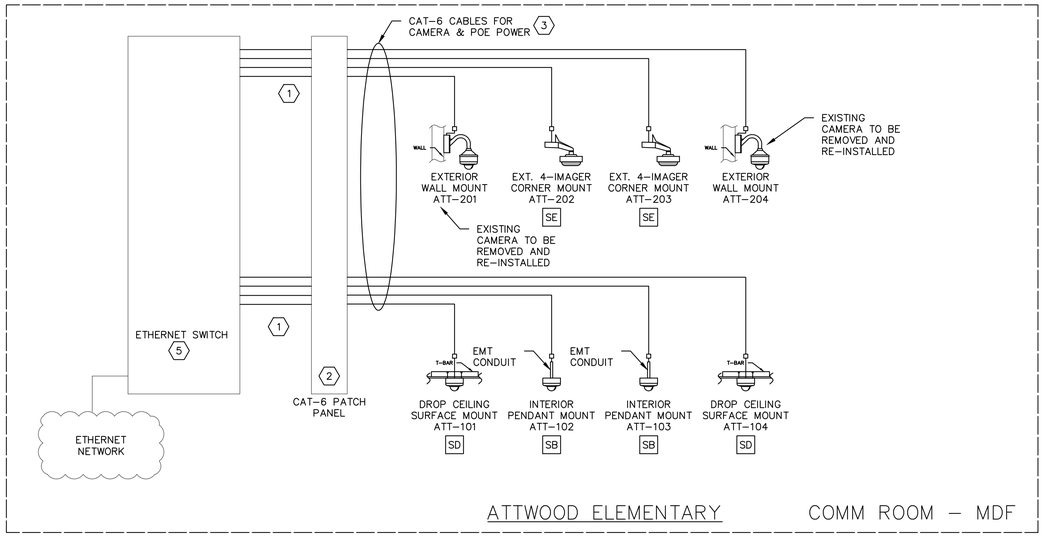
SECURITY EQUIPMENT DETAILS

Drawing Number

TC106

GENERAL VIDEO SECURITY NOTES:

1. CONTRACTOR SHALL PROVIDE ALL PATCH CABLES AT THE CAMERA AND AT THE COMM ROOM. MATCH COLOR OF CAMERA CABLE. 12" LONG AT SWITCH. 10' AT THE CAMERA
2. THE CONTRACTOR SHALL SUPPLY ANY & ALL BALUNS, COUPLERS ADAPTERS & CONVERTERS THAT ARE REQUIRED FOR THE INTER-CONNECTION OF ALL THE SECURITY COMPONENTS.
3. THE CAMERA CABLES SHALL TRANSPORT ALL VIDEO SIGNALS & CONTROL SIGNALS & POWER SIGNALS.
4. CONTRACTOR SHALL PROVIDE THE CORRECT CAMERA MOUNT BASED ON CAMERA LOCATION AND STRUCTURE AVAILABLE. PROVIDE RECESSED CAMERA MOUNTS IN DROP CEILINGS. REVIEW PLANS AND SITE PRIOR TO ORDERING.
5. CAMERAS IN DROP CEILINGS SHALL BE RECESSED MOUNT. PROVIDE BACKPLATE OR T-BAR FOR SUPPORT FROM GRID, NOT JUST THE TILE.
6. CONTRACTOR SHALL MEET WITH THE OWNER AND DETAIL ALL THE CAPABILITIES OF THE SYSTEM. THE CONFIGURATION OF THE RECORDER AND CAMERAS SHALL BE BASED ON THESE MEETINGS WITH THE OWNER. TAKE NOTES DURING THE MEETINGS. SUBMIT WITH AS-BUILTS
7. WHERE THE CAMERA IS NOT INSTALLED INTO A DROP CEILING THE CONTRACTOR SHALL PROVIDE A MOUNT AND HOUSING. PROVIDE WEATHERPROOF MOUNTS ON EXTERIOR CAMERAS.
8. EXTERIOR CAMERAS SHALL BE RATED FOR OUTDOOR INSTALLATION AND SHALL PROVIDE THEIR OWN HEAT.
9. CONTRACTOR SHALL PROVIDE THE CORRECT LENS TO EACH CAMERA BASED ON THE INSTALLED LOCATION AND THE OWNERS REQUIREMENTS FOR THE FIELD OF VIEW. WORK WITH THE OWNER DURING INSTALLATION.
10. ALL CAMERAS SHALL CONNECT TO THE IP NETWORK SWITCH IN THE COMMUNICATIONS ROOM. CONTRACTOR SHALL WORK WITH THE OWNER ON CONFIGURATION OF THE ETHERNET SWITCH.
11. CONTRACTOR SHALL MEET WITH THE OWNER AND DETAIL ALL THE CAPABILITIES OF THE SYSTEM. THE CONFIGURATION OF THE RECORDER AND CAMERAS SHALL BE BASED ON THESE MEETINGS WITH THE OWNER. TAKE NOTES DURING THE MEETINGS. SUBMIT WITH AS-BUILTS



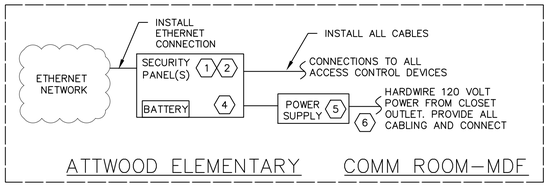
ATTWOOD ELEMENTARY COMM ROOM - MDF

REFER TO THE PLANS FOR CAMERA LOCATIONS

KEYED VIDEO SECURITYNOTES:

1. PROVIDE ALL PATCH CABLES REQUIRED FOR CONNECTION OF ALL CAMERAS AT THE CAMERA AND AT THE NETWORK SWITCH. ALL PATCH CABLES SHALL BE MATCH CABLE COLOR
2. LABEL THE CAT-6 PATCH PANEL WITH THE CAMERA NUMBER THE CABLE CONNECTS TO. SHALL BE LASER PRINTED. SEE SPECS
3. SEE SPECIFICATIONS AND BID SCOPES TO DETERMINE WHICH CONTRACTOR IS TO INSTALL AND TERMINATE THE CAT-6 CABLES USED FOR SECURITY CAMERAS.
4. THE SERVER(S) ARE EXISTING AND CONTRACTOR SHALL FIELD VERIFY LOCATION OF THE COMMUNICATIONS ROOM IN THE BUILDING NOTED. CONTRACTOR SHALL LOAD ALL SOFTWARE REQUIRED TO RECORD AND MANAGE ALL CAMERAS THROUGHOUT THE REMODELED AREA.
5. THE SECURITY CONTRACTOR SHALL MEET WITH THE OWNER TO CONFIRM ALL NETWORK SPECIFICATION REQUIREMENTS FOR A VLAN OR OTHER QUALITY OF SERVICE SETTINGS FOR THE CAMERA SYSTEM

4 TC107 VIDEO SECURITY DIAGRAM ATTWOOD ELEMENTARY



ATTWOOD ELEMENTARY COMM ROOM-MDF

CONNECTIVITY NOTES:

1. PROVIDE THE QUANTITY OF EACH ITEM AS SHOWN ON THE DRAWINGS.
2. THE COMMUNICATIONS CONTRACTOR SHALL WORK WITH THE OWNER TO CONFIGURE THE SYSTEM TO MEET THE OWNERS REQUIREMENTS.
3. CABLES FOR CONNECTION FROM THE ACCESS CONTROL PANELS SHALL BE PLENUM RATED.
4. CONTRACTOR SHALL PROVIDE ALL CABLING FOR CONNECTION OF NEW SECURITY DEVICES. THE CABLES SHALL BE THE SAME COLOR. COORDINATE CABLE COLOR WITH OTHER CONTRACTORS SO THAT THE SECURITY CABLES ARE A UNIQUE COLOR.
5. ALL CABLES SHALL BE LABELED AT EACH END. LABEL THEM WITH THE DOOR NUMBER AND THEN FOR THE DEVICE TO WHICH THEY CONNECT. IN EXAMPLE: P124-DC.
6. THE CONTRACTOR SHALL INCLUDE SUFFICIENT TIME INTO THE PROJECT TO CUSTOM CONFIGURE THE ACCESS CONTROL SYSTEM TO INTERFACE AND CONTROL EACH SYSTEM SHOWN ON THE DIAGRAM AND DESCRIBED IN THE SPECIFICATIONS.
7. PROVIDE THE QUANTITY OF BADGES/FOBS/MOBILE CREDENTIALS AS NOTED. PRINT ALL PROXIMITY CARDS AS PER THE OWNERS DIRECTION.

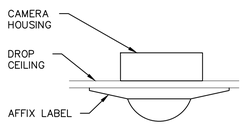
THIS DIAGRAM SHOWS CONNECTIVITY & DOES NOT INDICATE THE TYPE & QUANTITY OF ACCESS CONTROL & INTRUSION DETECTION DEVICES. SEE FLOOR PLANS FOR QUANTITY.

KEYED NOTES:

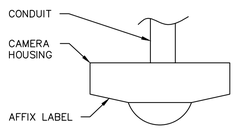
1. ACCESS CONTROL PANELS SHALL BE LOCATED WHERE SHOWN ON THE DRAWINGS. CONNECT ALL DEVICES TO THESE PANELS. ALSO PROVIDE CABLING TO CONNECT THE PANELS TO THE ETHERNET SWITCHES IN THE RACKS.
2. WHERE MORE THAN ONE PANEL IS AT THE SAME LOCATION, THE CONTRACTOR CAN CONNECT ONE PANEL TO THE ETHERNET NETWORK AND CONNECT THE OTHER PANELS TO THE ETHERNET CONNECTED PANEL.
3. NOT USED.
4. INSTALL BATTERY BACKUP TO EACH PANEL TO SUPPORT DURING A SHORT POWER OUTAGE. SEE SPECIFICATIONS FOR BATTERY BACKUP REQUIREMENTS.
5. THE CONTRACTOR SHALL PROVIDE A POWER SUPPLY IN THE COMMUNICATIONS ROOM TO POWER ALL THE DOOR HARDWARE.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTING THE PANELS TO 120 VOLT POWER. CONNECT WITH A HARDWIRED CONNECTION. PROVIDE CABLING AND CONDUIT/BOXES FOR CONNECTIVITY

1 TC107 ACCESS CONTROL DIAGRAM

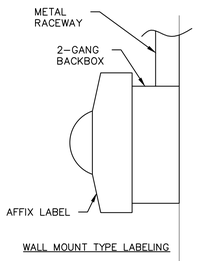
NOTES:
1. INSTALL A SELF-ADHESIVE, LASER PRINTER LABEL TO THE CAMERA THAT IS VISIBLE FROM BELOW THE DROP CEILING.
2. LABEL SHALL BE OF STRONG ADHESIVE TO ATTACH TO CAMERA HOUSING. LABEL SHALL MATCH THE CAMERA NUMBER IN THE SOFTWARE.
3. DEMONSTRATE TO THE DESIGNER THE LABEL AND WHERE THE LABEL WILL BE AFFIXED TO EACH CAMERA PRIOR TO INSTALLATION. AFFIX A LABEL TO EACH CAMERA



DROP CEILING LABELING



PENDANT TYPE LABELING



WALL MOUNT TYPE LABELING

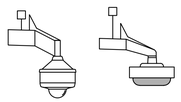
XX-DDD

ADHESIVE CAMERA LABEL

XX = BUILDING NAME
DDD = CAMERA NUMBER

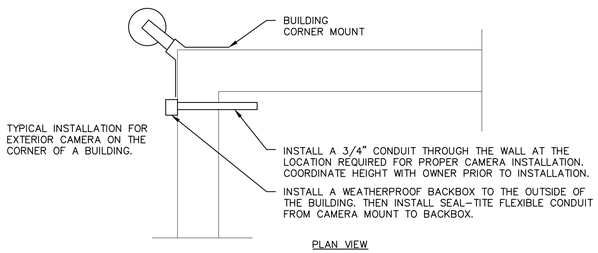
3 TC104 CAMERA LABELING VISIBLE PORTION OF THE BUILDING

EXTERIOR CORNER MOUNT

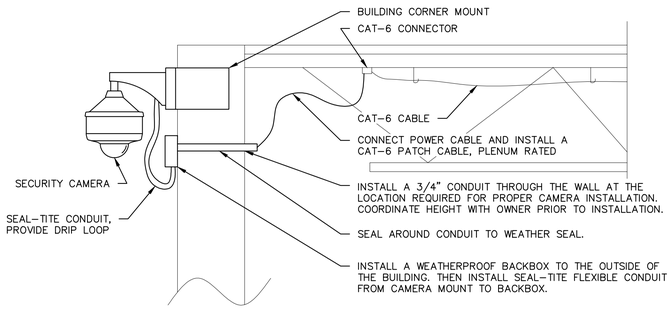


CORNER WALL MOUNT ON ONE-LINE DIAGRAM

NOTES:
1. INSTALL A CORNER MOUNT AT HEIGHT APPROVED BY OWNER.
2. INSTALL PATCH CABLE FROM CAT-6 CONNECTOR TO CAMERA. SHALL BE PLENUM RATED.
3. ALL CAMERAS SHALL BE INSTALLED WITH SECURE SCREWS.



PLAN VIEW



ELEVATION

5 TC107 EXTERIOR CORNER, WALL MOUNT CAMERA INSTALLATION

NOT TO SCALE

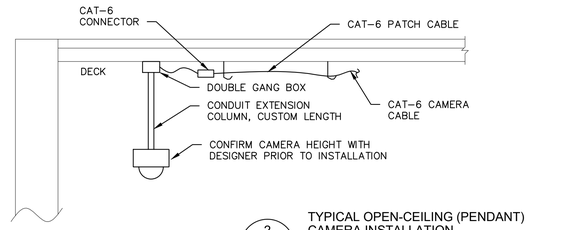
PENDANT MOUNT IN OPEN CEILING



PENDANT MOUNT ON ONE-LINE DIAGRAM

NOTES
1. INSTALL CAMERA IN A PENDANT MOUNT SUPPORTED BY CONDUIT TO THE DECK OR STRUCTURE..
2. INSTALL THE PATCH CABLE FROM CAT-6 CONNECTOR TO CAMERA. SHALL BE PLENUM RATED.
3. INSTALL A LABEL ON THE CAMERA THAT IS VISIBLE FROM BELOW.

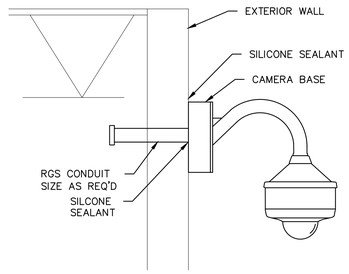
TYPICAL INSTALLATION FOR INTERIOR CAMERA IN AN OPEN CEILING PENDANT MOUNT



2 TC107 TYPICAL OPEN-CEILING (PENDANT) CAMERA INSTALLATION

NOTES

1. CORE THROUGH EXTERIOR WALL TO INSTALL A CONDUIT FROM THE INTERIOR TO THE EXTERIOR CAMERA BACKBOX.
2. CONDUIT SHALL BE NO SMALLER THAN 3/4" TRADE SIZE. INSTALL A NYLON GROMMET ON END OF CONDUIT.
3. SEAL AROUND CAMERA BASE WITH CLEAR SILICONE SEALANT. SEAL AROUND CONDUIT ON EXTERIOR WITH SEALANT.
4. ATTACH CAMERA BASE TO THE BUILDING WITH MECHANICAL CONNECTORS.



3 TC107 CAMERA THROUGH WALL RACEWAY & SEALANT DETAIL

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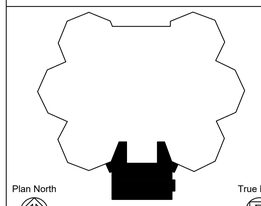
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Lansing School District

ATTWOOD ELEMENTARY CAFETERIA ADDITION

915 ATTWOOD DR
LANSING, MI 48911

Date Revised	Description
9/18/2023	BIDS & PERMITS



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Designer	Reviewer
D HILLIKER	B VERHAGE
Date Issued	Project Number
9/18/2023 BIDS & PERMITS	23005898A

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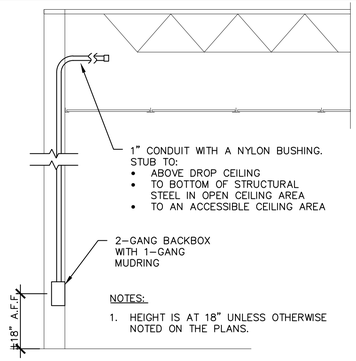
SECURITY EQUIPMENT DETAILS

Drawing Number

TC107

RACEWAY SYMBOL LEGEND

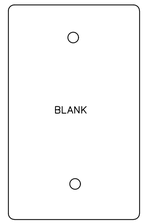
SYMBOL	DESCRIPTION
(1)	THIS SYMBOL WITH A NUMBER INSIDE REFERS TO KEYNOTES. REFER TO NOTES ON THE SHEET OR WITHIN THE DETAIL FOR ADDITIONAL INFORMATION
X"	PASS THRU. CONDUIT WITH GROMMETS TO BE INSTALLED. SIZE AS NOTED. NO LESS THAN 1". SEE DETAILS ON TRXXX FLOOR PLANS AND DETAILS. SEAL PER UL REQUIREMENTS
X"	VERTICAL RISER CONDUIT WITH GROMMETS TO BE INSTALLED. SIZE AS NOTED. SEE DETAILS ON TRXXX FLOOR PLANS AND DETAILS. SEAL PER UL REQUIREMENTS
(E)	RACEWAY SYMBOL. SEE TRXXX SHEETS FOR DETAILS FOR RACEWAY REQUIREMENTS.



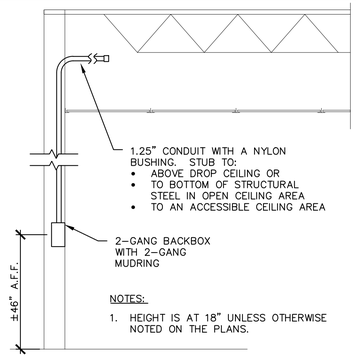
A

RACEWAY CODE

QTY	DESCRIPTION	PART #
1	SINGLE-GANG BLANK PLATE	STAINLESS STEEL



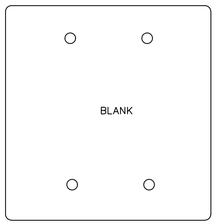
1 TC108 RACEWAY CODE



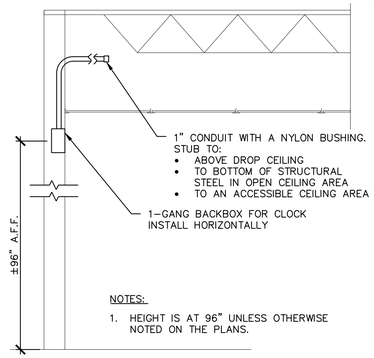
B

RACEWAY CODE

QTY	DESCRIPTION	PART #
1	DOUBLE-GANG BLANK PLATE	STAINLESS STEEL



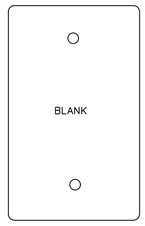
2 TC108 RACEWAY CODE



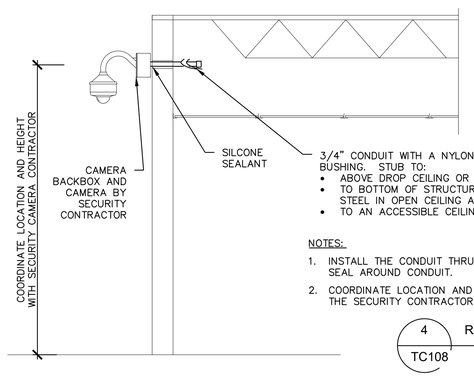
C

RACEWAY CODE

QTY	DESCRIPTION	PART #
1	SINGLE-GANG BLANK PLATE	STAINLESS STEEL



3 TC108 RACEWAY CODE -CLOCK



D

RACEWAY CODE

QTY	DESCRIPTION	PART #
1	3/4" CONDUIT THRU WALL AT HEIGHT COORDINATED WITH SECURITY CONTRACTOR	

4 TC108 RACEWAY CODE

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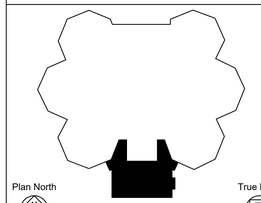
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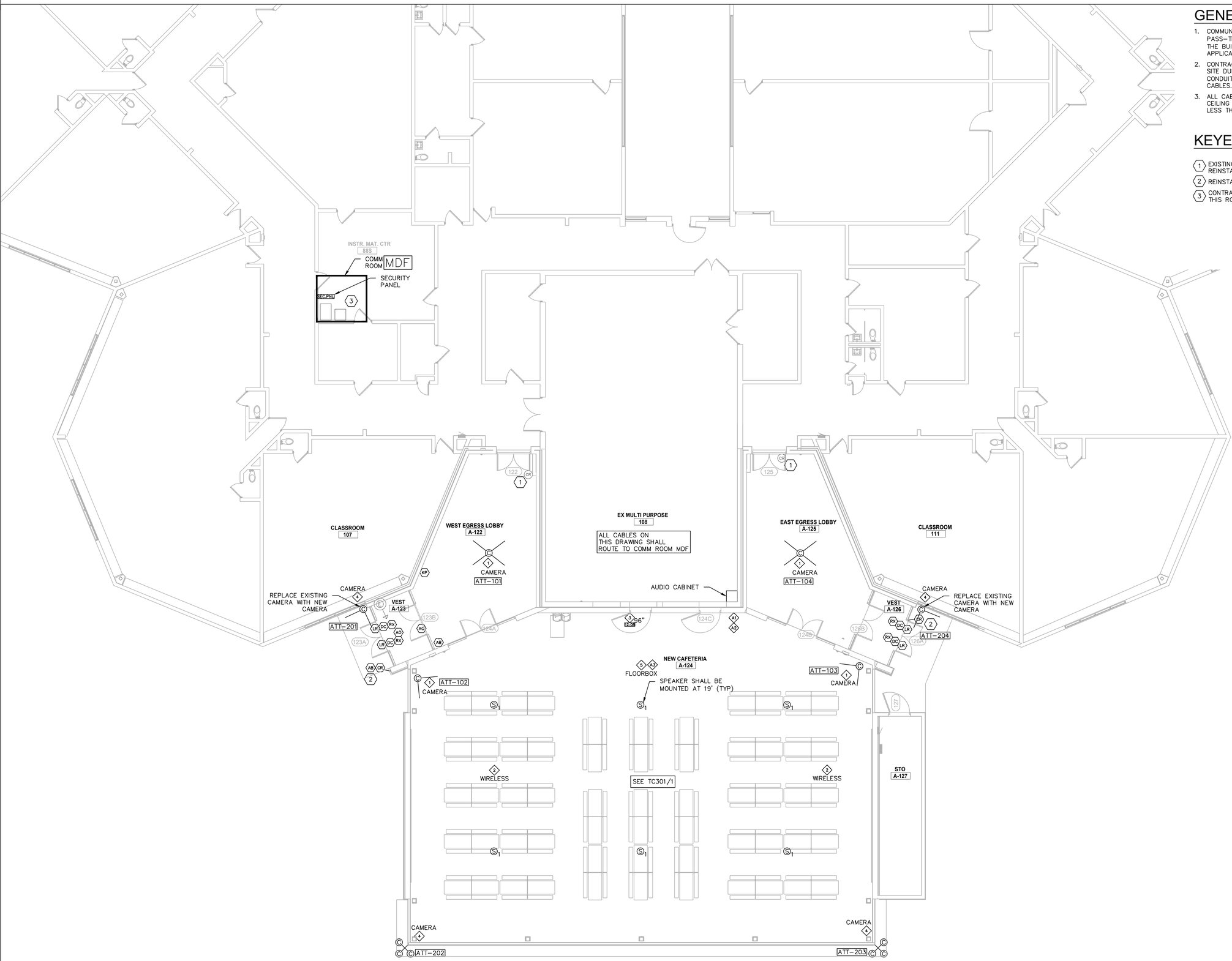
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Designer	Reviewer
D HILLIKER	B VERHAGE
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Sheet Name

RACEWAY CODES

Drawing Number

TC108



GENERAL TECH NOTES

1. COMMUNICATIONS CONTRACTOR SHALL INSTALL ANY PASS-THRU'S REQUIRED FOR ROUTING CABLES AROUND THE BUILDING. FIRESTOP ALL PASS-THRU'S TO MEET APPLICABLE CODES.
2. CONTRACTOR SHALL COMPLETE A WALK-THRU OF THE SITE DURING CONSTRUCTION AND SHALL VERIFY ALL CONDUITS AND PASS THRU'S ARE INSTALLED FOR CABLES.
3. ALL CABLES SHALL BE SUPPORTED ABOVE THE DROP CEILING BY J-HOOKS. HOOKS SHALL BE LOCATED NO LESS THAN EVERY 5 FEET.

KEYED TECH NOTES

1. EXISTING CARD READER TO BE REMOVED AND REINSTALLED ON NEW DOORS.
2. REINSTALL EXISTING CARD READER AT THIS LOCATION.
3. CONTRACTOR SHALL INSTALL NEW SECURITY PANEL IN THIS ROOM. FIELD VERIFY EXACT LOCATION.

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Plan North

True North

Key Plan

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FIRST FLOOR TECHNOLOGY PLAN

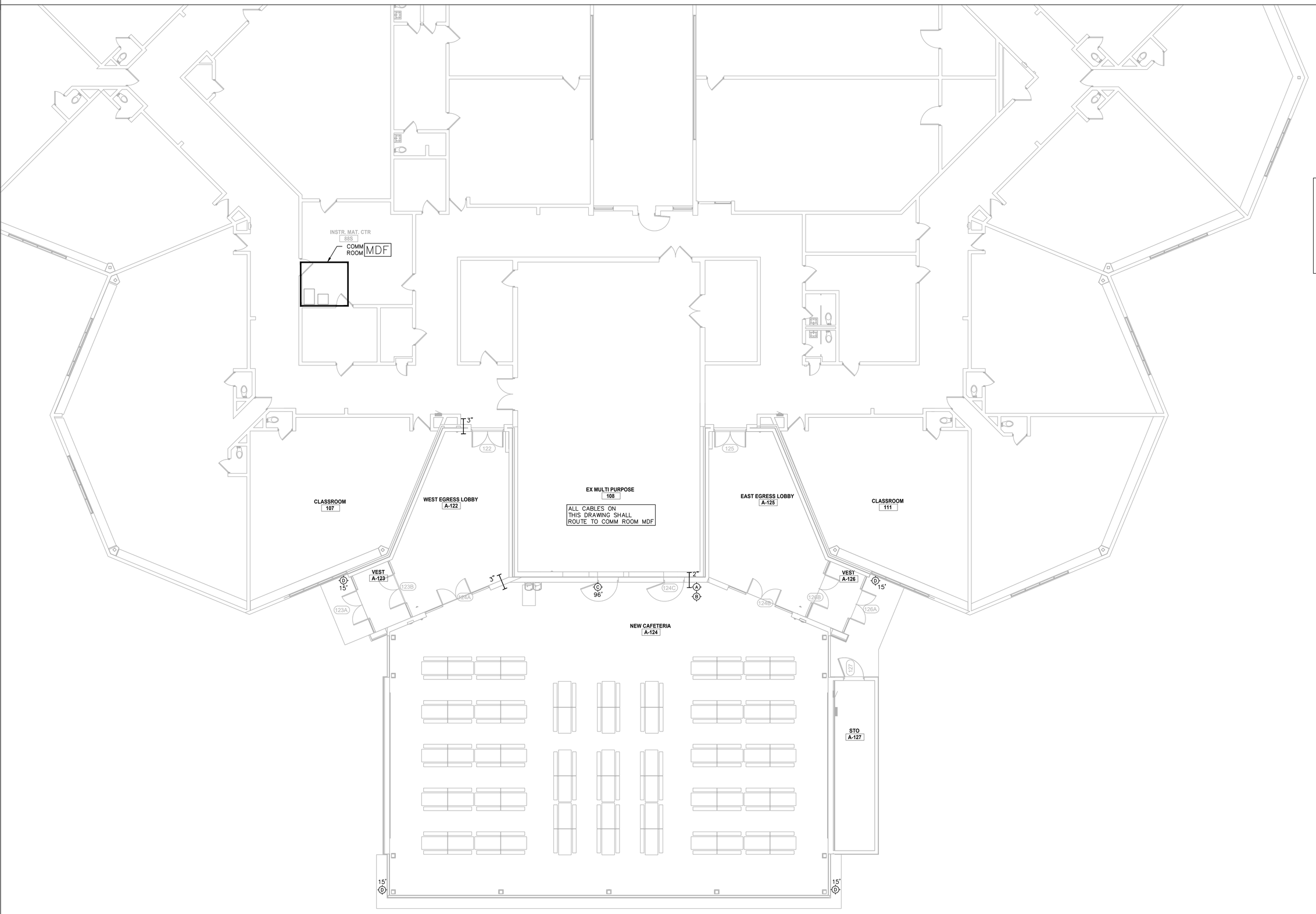
Drawing Number

TC901

N

1 TC901 FIRST FLOOR TECHNOLOGY PLAN

1/8"=1'-0" 0 1'



N

1 TC902 FIRST FLOOR RACEWAY PLAN

1/8"=1'-0" 0 1'

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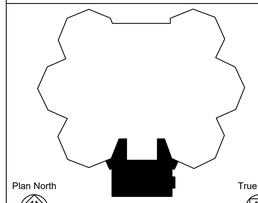
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Sheet Name

FIRST FLOOR RACEWAY PLAN

Drawing Number

TC902