

PROJECT MANUAL FOR:
SOUTH FARM SWINE RESEARCH & EDUCATION FACILITY ADDITION

PROJECT NUMBER:
CP230851

AT
UNIVERSITY OF MISSOURI - COLUMBIA
COLUMBIA, MISSOURI

FOR:
THE CURATORS OF THE UNIVERSITY OF MISSOURI

PREPARED BY:

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Overland Park, KS 66211
913.451.1818

DATE: December 7, 2023

VOLUME 1

I hereby certify that Drawing Sheets G0.00, G0.01, G0.10, G0.11, G0.30, A0.00, A0.11, A1.10, A1.11, A1.12, A1.13, A1.21, A1.30, A2.10, A3.10, A4.10, A6.10, A6.40, A8.10, F1.10, and Specification Sections 017419, 024119, 055051, 066000 & Specification Divisions 7-12 have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



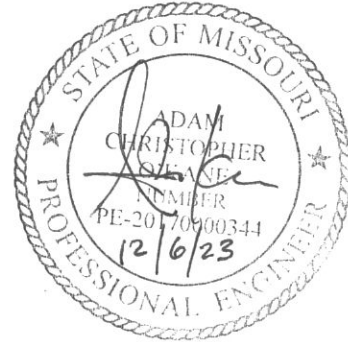
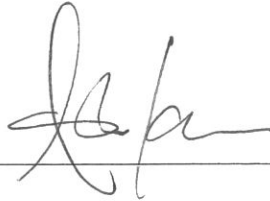
I hereby certify that Drawing Sheets C0.51, C0.52, C1.01, C2.01, C3.01, C4.01, C4.11, C5.01, C6.01, C6.11, and C6.21 and Specification Sections 01 57 13a, 01 57 13b, 31 10 00, 31 20 00, 31 23 19, 32 13 13, 32 13 73, 32 31 13, 32 91 19, 32 92 19, 33 31 00, 33 41 00, 33 46 13 have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and Specifications are as required by and in compliance with Building Codes of the University of Missouri.



Signature: _____

I hereby certify that Drawing Sheets S0.01, S1.01, S2.01, S3.01, S3.11, S3.21 and Specification Sections 031000, 032000, 033000, 042200, 055000, 061000, 061600, 061753 have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



I hereby certify that Drawing Sheets FS1.01, M0.00, M1.01, M1.02, M1.03, M2.01, M3.01, M4.01, M4.02, M4.03, M4.04, M5.01, M5.02, M6.01, M6.02, and Specification Division 21-23 have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



I hereby certify that Drawing Sheets E0.00, E0.01, E0.10, E1.11, E2.11, E3.01, E3.02, E4.01, E4.02, E5.01, E5.02, and Specification Divisions 26-28 have been prepared by me, or under my supervision. I further certify that to the best of my knowledge these Drawings and Specifications are as required by and in compliance with Building Codes of the University of Missouri.

Signature: _____



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PROJECT MANUAL FOR:
SOUTH FARM – SWINE RESEARCH AND EDUCATION FACILITY ADDITION

PROJECT NUMBER:
CP230851

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PLANNING DESIGN & CONSTRUCTION

900 E. Stadium, Ste. 130
Columbia, Missouri 65211
Telephone: (573) 882-6800

ADVERTISEMENT FOR BIDS

Sealed bids for:

SOUTH FARM SWINE RESEARCH & EDUCATION FACILITY –
CONSTRUCT ADDITION
UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI

PROJECT NUMBER: CP230851

CONSTRUCTION ESTIMATE: \$3,546,502 - \$3,940,558

will be received by the Curators of the University of Missouri, Owner, at Planning, Design & Construction, Room L100 (Front Reception Desk), General Services Building, University of Missouri, Columbia, Missouri 65211, until 1:30 p.m., C.T., January 11, 2024 and then immediately opened and publicly read aloud.

Drawings, specifications, and other related contract information may be obtained at <http://operations-webapps.missouri.edu/pdc/adsite/ad.html>. Electronic bid sets are available at no cost and may be printed as desired by the plan holders. No paper copies will be issued. If paper copies are desired, it is the responsibility of the user to print the files or have them printed.

Questions regarding the scope of work should be directed to Hadley Stolte with Clark & Enersen at (816) 474-8237 or hadley.stolte@clarkenersen.com. Questions regarding commercial conditions should be directed to Jody Miller at (573) 884-8912 or jrmiller@missouri.edu.

A prebid meeting will be held at 10:00 a.m., C.T., December 18, 2023 in the General Services Bldg., Room 194B, followed by a site walk-through.

A Diversity Participation goal of 10% MBE, 10% Combined WBE, DBE, Veteran Owned Business and 3% SDVE has been established for this contract.

The Owner reserves the right to waive informalities in bids and to reject any and all bids.

Individuals with special needs as addressed by the Americans with Disabilities Act may contact (573) 882-6800.

Advertisement Date: December 11, 2023

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SECTION 1.A

BID FOR LUMP SUM CONTRACT

Date: _____

BID OF _____
(hereinafter called "Bidder") a corporation* organized and existing under laws of the State of _____,
a partnership* consisting of _____,
an individual* trading as _____,
a joint venture* consisting of _____.

*Insert Corporation(s), partnership or individual, as applicable.

TO: Curators of the University of Missouri
Campus Facilities. Planning, Design and Construction
General Services Building
Room L100
University of Missouri
Columbia, Missouri 65211

1. Bidder, in compliance with invitation for bids for construction work in accordance with Drawings and Specifications prepared by CLARK & ENERSEN, entitled "SOUTH FARM SWINE RESEARCH & EDUCATION FACILITY – CONSTRUCT ADDITION", project number CP230851, dated December 7, 2023 having examined Contract Documents and site of proposed work, and being familiar with all conditions pertaining to construction of proposed project, including availability of materials and labor, hereby proposes to furnish all labor, materials and supplies to construct project in accordance with Contract Documents, within time set forth herein at prices stated below. Prices shall cover all expenses, including taxes not covered by the University of Missouri’s tax exemption status, incurred in performing work required under Contract documents, of which this Bid is a part.

Bidder acknowledges receipt of following addenda:

Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____
Addendum No. _____ Dated _____

2. In following Bid(s), amount(s) shall be written in both words and figures. In case of discrepancy between words and figures, words shall govern.

3. **BID PRICING**

a. Base Bid:

The Bidder agrees to furnish all labor, materials, tools, and equipment required to complete and coordinate the site work and new construction of a single story swine research addition to the existing swine research facility including all mechanical, electrical, plumbing, fire protection, and low voltage systems; all as indicated on the Drawings and described in these Specifications for sum of

_____ DOLLARS (\$_____).

b. Additive Alternate Bids:

Above Base Bid may be changed in accordance with following Alternate Bids as Owner may elect. Alternates are as described in Section 1.H of Project Manual. Alternates are written in a priority order, but Owner is not required to accept or reject in order listed. This is a one (1) contract project, therefore, Alternates shall be studied by each Bidder to determine effect on Bids of Contractor and each Subcontractor and/or Material supplier.

(1) Additive Alternate No. 1: Swine Penning

Provide and install stainless steel modular swine pens as indicated in the contract documents as Alternate #1 in holding rooms 1029B, 1030B, 1031B, 1032B. Pens shall be a modular system and attach to the CIP floor slab and CMU wall with expansion anchor bolted connections. All for sum of:

_____ DOLLARS (\$_____).

(2) Additive Alternate No. 2: Surgery Lights

Provide and install (2) surgery lights as specified. All for sum of:

_____ DOLLARS (\$_____).

(3) Additive Alternate No. 3: Composter pad, dumpster pad, and additional site work

Provide and install concrete composter pad, dumpster pad, & sidewalk, as well as new gravel drive around composter area. All for sum of:

_____ DOLLARS (\$_____).

(4) Additive Alternate No. 4: Diesel Generator

Provide and install a new 300 kW diesel generator on a new concrete generator pad located on site, northwest of the building. A new automatic transfer switch shall be installed in the main electrical room along with necessary control wiring between the ATS and the generator. A generator annunciator panel shall be provided in "Open Office 1007" along with all necessary interconnection between annunciator panel and generator control panel. Provide site bollards around the generator per the contract documents. All for sum of:

_____ DOLLARS (\$_____).

c. Unit Prices:

(1) For changing specified quantities of work from those indicated by Contract Drawings and Specifications, upon written instructions of Owner, the following Unit Prices shall prevail in accordance with General Conditions.

(2) The following Unit Prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover all work.

(3) The following Unit Prices are required where applicable to particular Base Bid and/or Alternate being submitted.

(4) Only a single Unit Price shall be given and it shall apply for either MORE or LESS work than that indicated on Drawings and called for in Specifications as indicated to be included in Base Bid and/or Alternates. In the event that more or less units than so indicated is actually furnished, Change Orders will be issued for increased or decreased amounts as approved by the Owner.

(5) Bidder understands that the Owner will not be liable for any Unit Price or any amount in excess of Base Bid and any Alternate(s) accepted at time of award of Contract, except as expressed in written Change Orders duly executed and delivered by Owner's Representative.

FILL IN ONLY ONE PRICE PER LINE

(6) Unsuitable material below exposed subgrade

- a. Description: Unit price for volume of unsuitable soil materials removed below Exposed subgrade as directed by the testing and inspection agency. This unit price shall include the replacement of an equal volume of satisfactory soil material.
- b. Exposed Subgrade: Surface or elevation remaining after completion of excavation to required elevations indicated on drawings and specifications is unclassified and shall be included in the base bid.

Base Bid Quantity = Per Construction Documents

1. Add \$ _____/Cubic Yard
Deduct \$ _____/Cubic Yard

d. Allowance – Not Used

4. PROJECT COMPLETION

a. Contract Period - Contract period begins on the day the Contractor receives unsigned Contract, Performance Bond, Payment Bond, and "Instructions for Execution of Contract, Bonds, and Insurance Certificates." Bidder agrees to complete project within three hundred sixty days (360) calendar days from receipt of aforementioned documents. Fifteen (15) calendar days have been allocated in construction schedule for receiving aforementioned documents from Bidder.

b. Commencement - Contractor agrees to commence work on this project after the "Notice to Proceed" is issued by the Owner. "Notice to Proceed" will be issued within seven (7) calendar days after Owner receives properly prepared and executed Contract documents listed in paragraph 4.a. above.

c. Liquidated Damages – Not Used

d. Refer to Scheduling Requirements in Special Conditions for specific scheduling of the following activities:

1. Site Work
2. Special Work Times
3. Utility Shut-downs, Outages and Tie-ins
4. HVAC Testing, Adjusting and Balancing

5. SUBCONTRACTOR LIST:

Bidder hereby certifies that the following subcontractors will be used in performance of Work:

NOTE: Failure to list subcontractors for each category of work identified on this form or listing more than one subcontractor for any category of work without designating the portion of work performed by each shall be grounds for rejection of bid. List name, city, and state of designated subcontractor, for each category of work listed in Bid For Lump Sum Contract. If work within a category will be performed by more than one subcontractor, Bidder shall provide name, city, and state of each subcontractor and specify exact portion of work to be performed by each. If acceptance/non-acceptance of Alternates will affect designation of a subcontractor, Bidder shall provide information, for each affected category, with this bid form. If Bidder intends to perform any designated subcontract work by using Bidder's own employees, then Bidder shall list their own name, city, and state. The bidder may petition the Owner to change a listed subcontractor only within 48 hours of the bid opening. See Information For Bidders Section 16 List of Subcontractors for requirements.

Work to be performed

Subcontractor Name,

City, State

Mechanical Contractor

Electrical Contractor _____

Fire Sprinkler Contractor _____

Fire Stopping Contractor _____

Concrete Contractor _____

Masonry Contractor _____

6. SUPPLIER DIVERSITY PARTICIPATION GOALS

a. The Contractor shall have as a goal, subcontracting with Minority Business Enterprise (MBE) of ten percent (10%); with Service Disabled Veteran Owned Business (SDVE) of three percent (3%); and with Women Business Enterprise (WBE), Disadvantage Business Enterprise (DBE), and/or Veteran Owned Business of ten percent (10%) of awarded contract price for work to be performed.

b. Requests for waiver of this goal shall be submitted on the attached Application For Waiver form. A determination by the Director of Facilities Planning & Development, UM, that a good faith effort has not been made by Contractor to achieve above stated goal may result in rejection of bid.

c. The Undersigned proposes to perform work with following Supplier Diversity participation level:

MBE PERCENTAGE PARTICIPATION: _____ percent (_____%)

SDVE PERCENTAGE PARTICIPATION: _____ percent (_____%)

WBE, DBE, and/or VETERAN PERCENTAGE PARTICIPATION: _____ percent (_____%)

d. A Supplier Diversity Compliance Evaluation form shall be submitted with this bid for each diverse subcontractor to be used on this project.

7. BIDDER'S ACKNOWLEDGMENTS

a. Bidder declares that he has had an opportunity to examine the site of the work and he has examined Contract Documents therefore; that he has carefully prepared his bid upon the basis thereof; that he has carefully examined and checked bid, materials, equipment and labor required thereunder, cost thereof, and his figures therefore. Bidder hereby states that amount, or amounts, set forth in bid is, or are, correct and that no mistake or error has occurred in bid or in Bidder's computations upon which this bid is based. Bidder agrees that he will make no claim for reformation, modifications, revisions or correction of bid after scheduled closing time for receipt of bids.

b. Bidder agrees that bid shall not be withdrawn for a period of sixty (60) days after scheduled closing time for receipt of bids.

c. Bidder understands that Owner reserves right to reject any or all bids and to waive any informalities in bidding.

d. Accompanying the bid is a bid bond, or a certified check or a cashier's check payable without

condition to "The Curators of the University of Missouri" which is an amount at least equal to five percent (5%) of amount of largest possible total bid herein submitted, including consideration of Alternates.

e. Accompanying the bid is a Bidder's Statement of Qualifications. Failure of Bidder to submit the Bidder's Statement of Qualifications with the bid may cause the bid to be rejected. Owner does not maintain Bidder's Statements of Qualifications on file.

f. It is understood and agreed that bid security of two (2) lowest and responsive Bidders will be retained until Contract has been executed and an acceptable Performance Bond and Payment Bond has been furnished. It is understood and agreed that if the bid is accepted and the undersigned fails to execute the Contract and furnish acceptable Performance/Payment Bond as required by Contract Documents, accompanying bid security will be realized upon or retained by Owner. Otherwise, the bid security will be returned to the undersigned.

8. BIDDER'S CERTIFICATE

Bidder hereby certifies:

a. His bid is genuine and is not made in interest of or on behalf of any undisclosed person, firm or corporation, and is not submitted in conformity with any agreement or rules of any group, association or corporation.

b. He has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid.

c. He has not solicited or induced any person, firm or corporation to refrain from bidding.

d. He has not sought by collusion or otherwise to obtain for himself any advantage over any other Bidder or over Owner.

e. He will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin in connection with performance of work.

f. By virtue of policy of the Board of Curators, and by virtue of statutory authority, a preference will be given to materials, products, supplies, provisions and all other articles produced, manufactured, mined or grown within the State of Missouri. By virtue of policy of the Board of Curators, preference will also be given to all Missouri firms, corporations, or individuals, all as more fully set forth in "Information For Bidders."

9. BIDDER'S SIGNATURE

Note: All signatures shall be original; not copies, photocopies, stamped, etc.

Authorized Signature	Date
Printed Name	Title
Company Name	
Mailing Address	
City, State, Zip	
Phone No.	Federal Employer ID No.
Fax No.	E-Mail Address
Circle one: Individual Partnership Corporation Joint Venture	
If a corporation, incorporated under the laws of the State of _____	
Licensed to do business in the State of Missouri? ___yes ___no	

(Each Bidder shall complete bid form by manually signing on the proper signature line above and supplying required information called for in connection with the signature. Information is necessary for proper preparation of the Contract, Performance Bond and Payment Bond. Each Bidder shall supply information called for in accompanying "Bidder's Statement of Qualifications.")

END OF SECTION

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**UNIVERSITY OF MISSOURI
BIDDER'S STATEMENT OF QUALIFICATIONS**

Submit with Bid for Lump Sum Contract in separate envelope appropriately labeled. Attach additional sheet if necessary.

1. Company Name _____

Phone# _____ Fax #: _____

Address _____

2. Number of years in business _____. If not under present firm name, list previous firm names and types of organization.

3. List contracts on hand (complete the following schedule, include telephone number).

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed
-------------------	------------------------------	--------------	-----------	-------------------------	-------------------

4. General character of work performed by your company personnel.

5. List important projects completed in the last five (5) years on a type similar to the work now bid for, including approximate cost and telephone number.

Project & Address	Owner/Owner's Representative	Phone Number	Architect	Amount of your Contract	Percent Completed
-------------------	------------------------------	--------------	-----------	-------------------------	-------------------

6. Other experience qualifying you for the work now bid.

7. No default has been made in any contract complete or incomplete except as noted below:

(a) Number of contracts on which default was made _____

(b) Description of defaulted contracts and reason therefor _____

8. (a) Have you or your company participated in any contract subject to an equal opportunity clause similar to that described in the General Conditions?

Yes _____ No _____

(b) Have you filed all required compliance reports?

Yes _____ No _____

- (c) Is fifty percent or more of your company owned by a minority?
Yes _____ No _____
- (d) Is fifty percent or more of your company owned by a woman?
Yes _____ No _____
- (e) Is fifty percent or more of your company owned by a service disabled veteran?
Yes _____ No _____
- (f) Is fifty percent or more of your company owned by a veteran?
Yes _____ No _____
- (g) Is your company a Disadvantaged Business Enterprise?
Yes _____ No _____

9. Have you or your company been suspended or debarred from working at any University of Missouri campus?
Yes _____ No _____ (If the answer is "yes", give details.)

10. Have any administrative or legal proceedings been started against you or your company alleging violation of any wage and hour regulations or laws?
Yes _____ No _____ (If the answer is "yes", give details.)

11. Workers Compensation Experience Modification Rates (last 3 yrs): _____ / _____ / _____
Incidence Rates (last 3 years): _____ / _____ / _____

12. List banking references.

- 13. (a) Do you have a current confidential financial statement on file with Owner?
Yes _____ No _____ (If not, and if desired, Bidder may submit such statement with bid, in a separate sealed and labeled envelope.)
- (b) If not, upon request will you file a detailed confidential financial statement within three (3) days?
Yes _____ No _____

Dated at _____ this _____ day of _____ 20_____

Name of Organization

Signature

Printed Name

Title of Person Signing

END OF SECTION

SUPPLIER DIVERSITY COMPLIANCE EVALUATION FORM

This form shall be completed by Bidders and submitted with the Bidder's Statement of Qualifications form for each diverse firm who will function as a subcontractor on the contract.

The undersigned submits the following data with respect to this firm's assurance to meet the goal for Supplier Diversity participation.

I. Project: _____

II. Name of General Contractor: _____

III. Name of Diverse Firm: _____
Address: _____

Phone No.: _____ Fax No.: _____

Status (check one) MBE _____ WBE _____ Veteran _____ Service Disabled Veteran _____ DBE _____

IV. Describe the subcontract work to be performed. (List Base Bid work and any Alternate work separately):
Base Bid: _____

V. Dollar amount of contract to be subcontracted to the Diverse firm:
Base Bid: _____
Alternate(s), (Identify separately): _____

VI. Is the proposed subcontractor listed in the Directory of M/W/DBE Vendors, Directory of Serviced Disabled Veterans and/or the Directory of Veterans maintained by the State of Missouri?
Yes _____ No _____

Is the proposed subcontractor certified as a diverse supplier by any of the following: federal government agencies, state agencies, State of Missouri city or county government agencies, Minority and/or WBE certifying agencies?

Yes _____

No _____

If yes, please provide details and attach a copy of the certification.

Does the proposed subcontractor have a signed document from their attorney certifying the Supplier as a Diverse and meeting the 51% owned and committed requirement?

Yes _____

No _____

If yes, please attach letter.

Signature:

Name:

Title:

Date:

APPLICATION FOR WAIVER

This form shall be completed and submitted with the Bidder's Statement of Qualifications. Firms wishing to be considered for award are required to demonstrate that a good faith effort has been made to include diverse suppliers. This form will be used to evaluate the extent to which a good faith effort has been made. The undersigned submits the following data with respect to the firm's efforts to meet the goal for Supplier Diversity Participation.

1. List pre-bid conferences your firm attended where Supplier Diversity requirements were discussed.

2. Identify advertising efforts undertaken by your firm which were intended to recruit potential diverse subcontractors for various aspects of this project. Provide names of newspapers, dates of advertisements and copies of ads that were run.

3. Note specific efforts to contact in writing those diverse suppliers capable of and likely to participate as subcontractors for this project.

4. Describe steps taken by your firm to divide work into areas in which diverse suppliers/contractors would be capable of performing.

5. What efforts were taken to negotiate with prospective diverse suppliers/contractors for specific sub-bids? Include the names, addresses, and telephone numbers of diverse suppliers/contractors contacted, a description of the information given to diverse suppliers/contractors regarding plans and specifications for the assigned work, and a statement as to why additional agreements were not made with diverse suppliers/contractors.

6. List reasons for rejecting a diverse supplier/contractor which has been contacted.

8. Describe the follow-up contacts with diverse suppliers/contractors made by your firm after the initial solicitation.

9. Describe the efforts made by your firm to provide interested diverse suppliers/contractors with sufficiently detailed information about the plans, specifications and requirements of the contract.

10. Describe your firm's efforts to locate diverse suppliers/contractors.

Based on the above stated good faith efforts made to include supplier diversity, the bidder hereby requests that the original supplier diversity percentage goal be waived and that the percentage goal for this project be set at _____ percent.

The undersigned hereby certifies, having read the answers contained in the foregoing Application for Waiver, that they are true and correct to the best of his/her knowledge, information and belief.

Signature _____

Name _____

Title _____

Company _____

Date _____

AFFIDAVIT

"The undersigned swears that the foregoing statements are true and correct and include all material information necessary to identify and explain the operation of _____ (name of firm) as well as the ownership thereof. Further, the undersigned agrees to provide through the prime contractor or directly to the Contracting Officer current, complete and accurate information regarding actual work performed on the project, the payment therefore and any proposed changes, if any, of the project, the foregoing arrangements and to permit the audit and examination of books, records and files of the named firm. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under federal or state laws concerning false statements."

Note - If, after filing this information and before the work of this firm is completed on the contract covered by this regulation, there is any significant change in the information submitted, you must inform the Director of Facilities Planning and Development of the change either through the prime contractor or directly.

Signature _____

Name _____

Title _____

Date _____

Corporate Seal (where appropriate)

Date _____

State of _____

County of _____

On this _____ day of _____, 19____,
before me appeared (name) _____ to me personally known, who, being
duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (name of firm)

_____ to execute the affidavit and did so as his or her own free act and deed.

(Seal)

Notary Public _____

Commission expires _____

AFFIDAVIT FOR AFFIRMATIVE ACTION

State of Missouri)
)
County of) ss.

_____ first being duly sworn on his/her oath states: that he/she is the (sole proprietor, partner, or officer) of _____ a (sole proprietorship, partnership, corporation), and as such (sole proprietor, partner, or officer) is duly authorized to make this affidavit on behalf of said (sole proprietorship, partnership, corporation); that under the contract known as " _____ " Project No. _____ less than 50 persons in the aggregate will be employed and therefore, the applicable Affirmative Action requirements as set forth in the "Nondiscrimination in Employment Equal Opportunity," Supplemental Special Conditions, and Article 13 in the General Conditions do not apply.

Subscribed and sworn before me this _____ day of _____, 19_____.

My commission expires _____, 19_____.

CERTIFYING SUPPLIER DIVERSITY AGENCIES

Diverse firms are defined in General Conditions Articles 1.1.7 and those businesses must be certified as disadvantaged by an approved agency. The Bidder is responsible for obtaining information regarding the certification status of a firm. A list of certified firms may be obtained by contacting the agencies listed below. Any firm listed as disadvantaged by any of the following agencies will be classified as a diverse firm by the Owner.

St. Louis Development Corporation
1520 Market St., Ste. 2000
St. Louis, MO 63103
P: 314.982.1400
W: www.stlouis-mo.gov/slcdc/

Bi-State Development
211 N. Broadway, Ste. 700
St. Louis, MO 63102
P: 314.982.1400
W: www.metrostlouis.dbesystem.com

St. Louis Minority Business Council
211 N. Broadway, Ste. 1300
St. Louis, MO 63102
P: 314.231.5555
W: www.slmbc.org

U.S. Small Business Administration - St. Louis, MO
8(a) Contractors, Minority Small Business
1222 Spruce Street, Suite 10.103
St. Louis, MO 63101
P: 314.539.6600
W: www.sba.gov

Lambert St. Louis International Airport
Business Diversity Development Office
11495 Navaid
Bridgeton, MO 63044
P: 314-426-8111
W: www.flystl.com/business/business-diversity-development-1/directories

City of Kansas City, Missouri
Human Relations Department, MBE/WBE Division
4th Floor, City Hall
414 E. 12th Street
Kansas City, MO 64106
P: 816.513.1836
W: kcmohrd.mwdbe.com/?TN=kcmohrd

Mid-States Minority Supplier Development Council
505 N. 7th Street, Ste. 1820
St. Louis, MO 63101
P: 314.278.5616
W: midstatesdc.org

U.S. Small Business Administration - Kansas City, MO
8(a) Contractors, Minority Small Business
1000 Walnut, Suite 500
Kansas City, MO 64106
P: 816.426.4900
W: kcmohrd.mwdbe.com/?TN=kcmohrd

Missouri Department of Transportation
Division of Construction
1617 Missouri Blvd.
P.O. Box 270
Jefferson City, MO 65102
P: 573.526.2978
W: www.modot.org/mrcc-directory

Illinois Department of Transportation
MBE/WBE Certification Section
2300 Dirksen Parkway
Springfield, IL 62764
217/782-5490; 217/785-1524 (Fax)
W: webapps.dot.illinois.gov/UCP/ExternalSearch

State of Missouri OA
Office of Equal Opportunity
301 W. High St. HSC Rm 870-B
Jefferson City, MO 65101
P: 877.259.2963
W: oa.mo.gov/sites/default/files/sdvelisting.pdf
oeo.mo.gov/

Minority Newspapers

Dos Mundos Bilingual Newspaper
902A Southwest Blvd.
Kansas City, MO 64108
816-221-4747
www.dosmundos.com

Kansas City Hispanic News
2918 Southwest Blvd.
Kansas City, MO 64108
816/472-5246
www.kchispanicnews.com

The Kansas City Globe
615 E. 29th Street
Kansas City, MO 64109
816-531-5253
www.thekcglobe.com/about_us.php

St. Louis American
4144 Lindell
St. Louis, MO 63108
314-533-8000
www.stlamerican.com

St. Louis Chinese American News
1766 Burns Ave, Suite 201
St. Louis, MO 63132
314-432-3858
www.scanews.com

St. Louis Business Journal
815 Olive St., Suite 100
St. Louis, MO 63101
314-421-6200
www.bizjournal.com/stlouis

Kansas City Business Journal
1100 Main Street, Suite 210
Kansas City, MO 64105
816-421-5900
www.bizjournals.com/kansascity

AFFIDAVIT OF SUPPLIER DIVERSITY PARTICIPATION

The apparent low Bidder shall complete and submit this form within 48 hours of bid opening for each Diverse firm that will participate on the contract.

1. Diverse Firm: _____
 Contact Name: _____
 Address: _____
 Phone No.: _____ E-Mail: _____

Status (check one) MBE WBE Veteran Service Disabled Veteran DBE
 If MBE, Certified as (circle one): 1) Black American 2) Hispanic American 3) Native American 4) Asian American

2. Is the proposed diverse firm certified by an approved agency [see IFB article 15]? Yes No

Agency: _____ [attach copy of certification authorization from agency]

Certification Number: _____

3. Diverse firm scope work and bid/contract dollar amount of participation (List Base Bid and Alternate work separately). The final Dollar amount will be determined at substantial completion:

	Scope of Work	Bid/Contract Amount	Final Dollar Amount
Base Bid			
Alternate #1			
Alternate #2			
Alternate #3			
Alternate #4			
Alternate #5			
Alternate #6			

The undersigned certifies that the information contained herein (i.e. Scope of Work and Bid/Contract Amount) is true and correct to the best of their knowledge, information and belief.

General Contractor: _____ Diverse Firm: _____

Signature: _____ Signature: _____

Name: _____ Name: _____

Title: _____ Title: _____

Date: _____ Date: _____

The undersigned certifies that the information contained herein (i.e. Scope of Work and Final Dollar Amount) is true and correct to the best of their knowledge, information and belief. If the Final Dollar Amount is different than the Bid/Contract Amount, then attach justification for the difference.

Contractor: _____ Diverse Firm: _____

Signature: _____ Signature: _____

Name: _____ Name: _____

Title: _____ Title: _____

Date: _____ Date: _____

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University of Missouri

INFORMATION FOR BIDDERS

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1. Contract Documents

1.1 Drawings, specifications, and other contract documents, pursuant to work, which is to be done, may be obtained shown in the Advertisement for Bids and Special Conditions.

2. Bidder Obligations

2.1 Before submitting bids, each bidder shall carefully examine the drawings and specifications and related contract documents, visit site of work, and fully inform themselves as to all existing conditions, facilities, restrictions, and other matters which can affect the work or the cost thereof.

2.2 Each bidder shall include in their bid the cost of all work and materials required to complete the contract in a first-class manner as hereinafter specified.

2.3 Failure or omission of any bidder to receive or examine any form, instrument, addendum, or other document, or to visit the site and acquaint themselves with existing conditions, shall in no way relieve them from any obligation with respect to their bid or contract, and no extra compensation will be allowed by reason of anything or matter concerning which bidder should have fully informed themselves prior to bidding.

2.4 Submission of bids shall be deemed acceptance of the above obligations and each and every obligation required to be performed by all of the contract documents in the event the bid is accepted.

3. Interpretation of Documents

3.1 If any prospective bidder is in doubt as to the true meaning of any part of the drawings and specifications or contract documents, they shall submit a written request to the Architect for an interpretation.

3.2 Requests for such interpretations shall be delivered to the Architect at least one (1) week prior to time for receipt of bids.

3.3 Bids shall be based only on interpretations issued in the form of addenda mailed to each person who is on the

Architect's record as having received a set of the contract documents.

4. Bids

4.1 Bids shall be received separately or in combination as shown in and required by the Bid for Lump Sum contract. Bids will be completed so as to include insertion of amounts for alternate bids, unit prices and cost accounting data.

4.2 Bidders shall apportion each base bid between various phases of the work, as stipulated in the Bid for Lump Sum contract. All work shall be done as defined in the specifications and as indicated on the drawings.

4.3 Bids shall be presented in sealed envelopes which shall be plainly marked "Bids for (indicate name of project from cover sheet)" and mailed or delivered to the building and room number specified in the Advertisement for Bids. Bidders shall be responsible for actual delivery of bids during business hours, and it shall not be sufficient to show that a bid was mailed in time to be received before scheduled closing time for receipt of bids, nor shall it be sufficient to show that a bid was somewhere in a university facility.

4.4 The bidder's price shall include all federal sales, excise, and similar taxes, which may be lawfully assessed in connection with their performance of work and purchase of materials to be incorporated in the work. City & State taxes shall not be included as defined within Article 3.16 of the General Conditions for Construction Contract included in the contract documents.

4.5 Bids shall be submitted on a single bid form, furnished by the Owner or Architect. Do not remove the bid form from the specifications.

4.6 No bidder shall stipulate in their bid any conditions not contained in the bid form.

4.7 The Owner reserves the right to waive informalities in bids and to reject any or all bids.

5. Modification and Withdrawal of Bids

5.1 The bidder may withdraw their bid at any time before the scheduled closing time for receipt of bids, but no bidder may withdraw their bid after the scheduled closing time for receipt of bids.

5.2 Only telegrams, letters and other written requests for modifications or correction of previously submitted bids, contained in a sealed envelope which is plainly marked "Modification of Bid on (name of project on cover sheet)," which are addressed in the same manner as bids, and are received by Owner before the scheduled closing time for receipt of bids will be accepted and bids corrected in accordance with such written requests.

6. Signing of Bids

6.1 Bids which are signed for a partnership shall be **manually** signed in the firm name by at least one partner, or in the firm name by Attorney-in-Fact. If signed by Attorney-in-Fact there should be attached to the bid, a Power of Attorney evidencing authority to sign the bid dated the same date as the bid and executed by all partners of the firm.

6.2 Bids that are signed for a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation manually written below corporate name. Title of office held by the person signing for the corporation shall appear below the signature of the officer.

6.3 Bids that are signed by an individual doing business under a firm name, shall be manually signed in the name of the individual doing business under the proper firm name and style.

6.4 Bids that are signed under joint venture shall be manually signed by officers of the firms having authority to sign for their firm.

7. Bid Security

7.1 Each bid shall be accompanied by a bid bond, certified check, or cashier's check, acceptable to and payable without condition to The Curators of the University of Missouri, in an amount at least equal to five percent (5%) of bidder's bid including additive alternates.

7.2 Bid security is required as a guarantee that bidder will enter into a written contract and furnish a performance bond within the time and in form as specified in these specifications; and if successful bidder fails to do so, the bid security will be realized upon or retained by the Owner. The apparent low bidder shall notify the Owner in writing within 48 hours (2 workdays) of the bid opening of any circumstance that may affect the bid security including, but not limited to, a bidding error. This notification will not guarantee release of the bidder's security and/or the bidder from the Bidder's Obligations.

7.3 If a bid bond is given as a bid security, the amount of the bond may be stated as an amount equal to at least five percent (5%) of the bid, including additive alternates, described in the bid. The bid bond shall be executed by the bidder and a responsible surety licensed in the State of Missouri with a Best's rating of no less than A-/XI.

7.4 It is specifically understood that the bid security is a guarantee and shall not be considered as liquidated damages for failure of bidder to execute and deliver their contract and performance bond, nor limit or fix bidder's liability to Owner for any damages sustained because of failure to execute and deliver the required contract and performance bond.

7.5 Bid security of the two (2) lowest and responsive Bidders will be retained by the Owner until a contract has been executed and an acceptable bond has been furnished, as required hereby, when such bid security will be returned. Surety bid bonds of all other bidders will be destroyed and all other alternative forms of bid bonds will be returned to them within ten (10) days after Owner has determined the two (2) lowest and responsive bids.

8. Bidder's Statement of Qualifications

8.1 Each bidder submitting a bid shall present evidence of their experience, qualifications, financial responsibility and ability to carry out the terms of the contract by completing and submitting with their bid the schedule of information set forth in the form furnished in the bid form.

8.2 Such information, a single copy required in a separate sealed envelope, will be treated as confidential information by the Owner, within the meaning of Missouri Statute 610.010.

8.3 Bids not accompanied with current Bidder's Statement of Qualifications may be rejected.

9. Award of Contract

9.1 The Owner reserves the right to let other contracts in connection with the work, including, but not by way of limitation, contracts for furnishing and installation of furniture, equipment, machines, appliances, and other apparatus.

9.2 In awarding the contract, the Owner may take into consideration the bidder's, and their subcontractor's, ability to handle promptly the additional work, skill, facilities, capacity, experience, ability, responsibility, previous work, financial standing of bidder, and the bidder's ability to provide the required bonds and insurance; quality, efficiency and construction of equipment proposed to be furnished; period of time within which equipment is proposed to be furnished and delivered; success in achieving the specified Supplier Diversity goal, or demonstrating a good faith effort as described in Article 15; necessity of prompt and efficient completion of work herein described, and the bidder's status as suspended or debarred. Inability of any bidder to meet the requirements mentioned above may be cause for rejection of their bid.

10. Contract Execution

10.1 The Contractor shall submit within fifteen (15) days from receipt of notice, the documents required in Article 9 of the General Conditions for Construction Contract included in the contract documents.

10.2 No bids will be considered binding upon the Owner until the documents listed above have been furnished. Failure of Contractor to execute and submit these documents within the time period specified will be treated, at the option of the

Owner, as a breach of the bidder's bid security under Article 7 and the Owner shall be under no further obligation to Bidder.

11. Contract Security

11.1 When the Contract sum exceeds \$50,000, the Contractor shall procure and furnish a Performance bond and a Payment bond in the form prepared by Owner. Each bond shall be in the amount equal to one hundred percent (100%) of the contract sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee Contractor's faithful performance of this Contract, including but not limited to Contractor's obligation to correct defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. These Bonds shall be in effect through the duration of the Contract plus the Guaranty Period as required by the Contract Documents.

11.2 The bonds required hereunder shall be meet all requirements of Article 11 of the General Conditions for Construction Contract included in the contract documents.

11.3 If the surety of any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this Article 11, Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to Owner. If Contractor fails to make such substitution, Owner may procure such required bonds on behalf of Contractor at Contractor's expense.

12. Time of Completion

12.1 Contractors shall agree to commence work within five (5) days of the date "Notice to Proceed" is received from the Owner, and the entire work shall be completed by the completion date specified or within the number of consecutive calendar days stated in the Special Conditions. The duration of the construction period, when specified in consecutive calendar days, shall begin when the contractor receives notice requesting the documents required in Article 9 of the General Conditions for Construction Contract included in the contract documents.

13. Number of Contract Documents

13.1 The Owner will furnish the Contractor a copy of the executed contract and performance bond.

13.2 The Owner will furnish the Contractor the number of copies of complete sets of drawings and specifications for the work, as well as clarification and change order drawings pertaining to change orders required during construction as set forth in the Special Conditions.

14. Missouri Products and Missouri Firms

14.1 The Curators of the University of Missouri have adopted a policy which is binding upon all employees and departments of the University of Missouri, and which by contract, shall be binding upon independent contractors and subcontractors with the University of Missouri whereby all other things being equal, and when the same can be secured without additional cost over foreign products, or products of other states, a preference shall be granted in all construction, repair and purchase contracts, to all products, commodities,

materials, supplies, and articles mined, grown, produced, and manufactured in marketable quantity and quality in the State of Missouri, and to all firms, corporations or individuals doing business as Missouri firms, corporations, or individuals. Each bidder submitting a bid agrees to comply with and be bound by the foregoing policy.

15. SUPPLIER DIVERSITY

15.1 Award of Contract

The Supplier Diversity participation goal for this project is stated on the Bid for Lump Sum Contract Form, and the Owner will take into consideration the bidder's success in achieving the Supplier Diversity participation goal in awarding the contract. Inability of any bidder to meet this requirement may be cause for rejection of their bid.

A 3-point Service-Disabled Veteran Enterprises (SDVE) bonus preference shall apply to this contract. The 3 bonus points can be obtained by a certified, Missouri based SDVE performing a commercially useful function, (as defined in Article 1 of the General Conditions of the Contract for Construction) either by submitting a bid directly to the Owner, or through the utilization of certified SDVE subcontractors and/or suppliers, whose participation provides at least 3% of the total bid amount. A firm does not perform a commercially useful function if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of SDVE participation. In determining whether a firm is such an extra participant, the Owner will examine similar transactions, particularly those in which SDVEs do not participate. The 3-point bonus preference shall be calculated and applied by reducing the bid amount of the eligible bidder by three (3) percent of the apparent low responsive bidder's bid. Based on this calculation, if the eligible bidder's resulting total bid valuation is less than the apparent low responsive bidder's bid, the eligible bid becomes the apparent low responsive bid. This reduction is for evaluation purposes only and will have no impact on the actual amount(s) of the eligible bidder's bid or the amount(s) of any contract awarded. The submitted bid form must include a minimum of 3% SDVE participation to obtain the three (3) point bonus. Failure to do so may be grounds for rejection of the SDVE bonus preference.

15.2 List of Supplier Diversity Firms

15.2.1 The bidder shall submit within 48 hours of the receipt of bids to the University Contracting Officer, a list of diverse firms performing as contractor, subcontractors, and/or suppliers. The list shall specify the single designated diverse firm name and address. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, provide information for each affected category.

15.2.2 Failure to include a complete list of diverse firms may be grounds for rejection of the bid.

15.2.3 The list of diverse firms shall be submitted in addition to any other listing of subcontractors required in the Bid for Lump Sum Contract Form.

15.3 Supplier Diversity Percentage Goal

The bidder shall have a minimum goal of subcontracting with diverse contractors, subcontractors, and suppliers, the percent of contract price stated in the Supplier Diversity goal paragraph of the Bid for Lump Sum Contract Form.

15.4 Supplier Diversity Percent Goal Computation

15.4.1 The total dollar value of the work granted to the diverse firms by the successful bidder is counted towards the applicable goal of the entire contract, unless otherwise noted below.

15.4.2 The bidder may count toward the Supplier Diversity goal only expenditures to diverse firms that perform a commercially useful function in the work of a contract. A diverse firm is considered to perform a commercially useful function when it is responsible for executing a distinct element of the work and carrying out its responsibilities by actually performing, managing, and supervising the work involved. A bidder that is a certified diverse firm may count as 100% of the contract towards the Supplier Diversity goal. For projects with separate MBE, SDVE, and WBE/Veteran/DBE goals, a MBE firm bidding as the prime bidder is expected to obtain the required SDVE, and WBE/Veteran/DBE participation; a WBE or Veteran or DBE firm bidding as the prime bidder is expected to obtain the required MBE and SDVE participation and a SDVE firm bidding as the prime bidder is expected to obtain the required MBE, and WBE/Veteran/DBE participation.

15.4.3 When a MBE, WBE, Veteran Business Enterprise, DBE, or SDVE performs work as a participant in a joint venture, only the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the MBE, WBE, Veteran Business Enterprise, DBE, or SDVE performs with its own forces shall count toward the MBE, WBE, Veteran Business Enterprise, DBE, or SDVE individual contract percentages.

15.4.4 The bidder may count toward its Supplier Diversity goal expenditures for materials and supplies obtained from diverse suppliers and manufacturers, provided the diverse firm assumes the actual and contractual responsibility for the provision of the materials and supplies.

15.4.4.1 The bidder may count its entire expenditure to a diverse manufacturer. A manufacturer shall be defined as an individual or firm that produces goods from raw materials or substantially alters them before resale.

15.4.4.2 The bidder may count its entire expenditure to diverse suppliers that are not manufacturers provided the diverse supplier performs a commercially useful function as defined above in the supply process.

15.4.4.3 The bidder may count 25% of its entire expenditures to diverse firms that do not meet the definition of a subcontractor, a manufacturer, nor a supplier. Such diverse firms may arrange for, expedite, or procure portions of the work but are not actively engaged in the business of performing, manufacturing, or supplying that work.

15.4.5 The bidder may count toward the Supplier Diversity goal that portion of the total dollar value of the work awarded to a certified joint venture equal to the percentage of the ownership and control of the diverse partner in the joint venture.

15.5 Certification by Bidder of Diverse Firms

15.5.1. The bidder shall submit, within 48 hours of the receipt of bids to the University Contracting Officer, the information requested in the "Supplier Diversity Compliance Evaluation Form" for every diverse firm the bidder intends to award work to on the contract.

15.5.2. Diverse firms are defined in Article 1 – (Supplier Diversity Definitions) of the General Conditions of the Contract for Construction included in the contract documents, and as those businesses certified as disadvantaged by an approved agency. The bidder is responsible for obtaining information regarding the certification status of a firm. A list of certified firms may be obtained by contacting the agencies listed in the proposal form document "Supplier Diversity Certifying Agencies." Any firm listed as disadvantaged by any of the identified agencies will be classified as a diverse firm by the Owner.

15.5.3. Bidders are urged to encourage their prospective diverse contractors, subcontractors, joint venture participants, team partners, and suppliers who are not currently certified to obtain certification from one of the approved agencies.

15.6 Supplier Diversity Participation Waiver

15.6.1 The bidder is required to make a good faith effort to locate and contract with diverse firms. If a bidder has made a good faith effort to secure the required diverse firms and has failed, the bidder shall submit within 48 hours of the receipt of bids to the University Contracting Officer, the information requested in "Application for Supplier Diversity Participation Waiver." The Contracting Officer will review the bidder's actions as set forth in the bidder's "Application for Waiver" and any other factors deemed relevant by the Contracting Officer to determine if a good faith effort has been made to meet the applicable percentage goal. If the bidder is judged not to have made a good faith effort, the bid may be rejected. Bidders who demonstrate that they have made a good faith effort to include Supplier Diversity participation may be awarded the contract regardless of the percent of Supplier Diversity participation, provided the bid is otherwise acceptable and is determined to be the best bid.

15.6.2 To determine good faith effort of the bidder, the Contracting Officer may evaluate factors including, but not limited to, the following:

15.6.2.1 The bidder's attendance at pre-proposal meetings scheduled to inform bidders and diverse firms of contracting and subcontracting opportunities and responsibilities associated with Supplier Diversity participation.

15.6.2.2 The bidder's advertisements in general circulation trade association, and diverse (minority) focused media concerning subcontracting opportunities.

15.6.2.3 The bidder's written notice to specific diverse firms that their services were being solicited in sufficient time to allow for their effective participation.

15.6.2.4 The bidder's follow-up attempts to the initial solicitation(s) to determine with certainty whether diverse firms were interested.

15.6.2.5 The bidder's efforts to divide the work into

packages suitable for subcontracting to diverse firms.

15.6.2.6 The bidder's efforts to provide interested diverse firms with sufficiently detailed information about the drawings, specific actions and requirements of the contract, and clear scopes of work for the firms to bid on.

15.6.2.7 The bidder's efforts to solicit for specific sub-bids from diverse firms in good faith. Documentation should include names, addresses, and telephone numbers of firms contacted a description of all information provided the diverse firms, and an explanation as to why agreements were not reached.

15.6.2.8 The bidder's efforts to locate diverse firms not on the directory list and assist diverse firms in becoming certified as such.

15.6.2.9 The bidder's initiatives to encourage and develop participation by diverse firms.

15.6.2.10 The bidder's efforts to help diverse firms overcome legal or other barriers impeding the participation of diverse firms in the construction contract.

15.6.2.11 The availability of diverse firms and the adequacy of the bidder's efforts to increase the participation of such business provided by the persons and organizations consulted by the bidder.

15.7 Submittal of Forms

15.7.1 Within 48 hours of the receipt of bids, the apparent low bidder shall submit to the University Contracting Officer all Supplier Diversity Compliance Evaluation Form(s), and/or Application for Waiver with supporting information per 15.6 above, and an "Affidavit of Supplier Diversity Participation" for every diverse subcontractor or supplier the bidder intends to award work to on the contract. The affidavit will be signed by both the bidder and the diverse firm. Failure to submit the documents in the time indicated may result in rejection of the bid.

15.8 Additional Bid/Proposer Information

15.8.1 The Contracting Officer reserves the right to request additional information regarding Supplier Diversity participation and supporting documentation from the apparent low bidder. The bidder shall respond in writing to the Contracting Officer within 24-hours (1 workday) of a request.

15.8.2 The Contracting Officer reserves the right to request additional information after the bidder has responded to prior 24-hour requests. This information may include follow up and/or clarification of the information previously submitted.

15.8.3 The Owner reserves the right to consider additional diverse subcontractor and supplier participation submitted by the bidder after bids are opened under the provisions within these contract documents that describe the Owner's right to accept or reject subcontractors including, but not limited to, Article 16 below. The Owner may elect to waive the good faith effort requirement if such additional participation achieves the Supplier Diversity goal.

15.8.4 The Bidder shall provide the Owner information related to the Supplier Diversity participation included in the bidder's proposal, including, but is not limited to, the complete Application for Waiver, evidence of diverse certification of participating firms, dollar amount of participation of diverse firms, information supporting a good faith effort as described in Article 15.6 above, and a list of all diverse firms that submitted bids to the Bidder with the diverse firm's price and the name and the price of the firm awarded the scope of work bid by the diverse firm.

16. List of Subcontractors

16.1 If a list of subcontractors is required on the Bid for Lump Sum Contract Form, the bidders shall list the name, city and state of the firm(s) which will accomplish that portion of the contract requested in the space provided. This list is separate from both the list of diverse firms required in Article 15.2, and the complete list of subcontractors required in Article 10.1 of this document. Should the bidder choose to perform any of the listed portions of the work with its own forces, the bidder shall enter its own name, city and state in the space provided. If acceptance or non-acceptance of alternates will affect the designation of a subcontractor, the bidder shall provide that information on the bid form.

16.2 Failure of the bidder to supply the list of subcontractors required or the listing of more than one subcontractor for any category without designating the portion of the work to be performed by each, shall be grounds for the rejection of the bid. The bidder can petition the Owner to change a listed subcontractor within 48 hours of the bid opening. The Owner reserves the right to make the final determination on a petition to change a subcontractor. The Owner will consider factors such as clerical and mathematical bidding errors, listed subcontractor's inability to perform the work for the bid used, etc. Any request to change a listed subcontractor shall include at a minimum, contractor's bid sheet showing tabulation of the bid; all subcontractor bids with documentation of the time they were received by the contractor; and a letter from the listed subcontractor on their letterhead stating why they cannot perform the work if applicable. The Owner reserves the right to ask for additional information.

16.3 Upon award of the contract, the requirements of Article 10 of this document and Article 5 of the General Conditions of the Contract for Construction included in the contract documents will apply.

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University of Missouri

General Conditions

of the

Contract

for

Construction

December 2021 Edition

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ARTICLE 1 GENERAL PROVISIONS

1.1 Basic Definitions

As used in the Contract Documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

1.1.1 Owner

The Curators of the University of Missouri. The Owner may act through its Board of Curators or any duly authorized committee or representative thereof.

1.1.2 Contracting Officer

The Contracting Officer is the duly authorized representative of the Owner with the authority to execute contracts. Communications to the Contracting Officer shall be forwarded via the Owner's Representative.

1.1.3 Owner's Representative

The Owner's Representative is authorized by the Owner as the administrator of the Contract and will represent the Owner during the progress of the Work. Communications from the Architect to the Contractor and from the Contractor to the Architect shall be through the Owner's Representative, unless otherwise indicated in the Contract Documents.

1.1.4 Architect

When the term "Architect" is used herein, it shall refer to the Architect or the Engineer specified and defined in the Contract for Construction or its duly authorized representative. Communications to the Architect shall be forwarded to the address shown in the Contract for Construction.

1.1.5 Owner's Authorized Agent

When the term "Owner's Authorized Agent" is used herein, it shall refer to an employee or agency acting on the behalf of the Owner's Representative to perform duties related to code inspections, testing, operational systems check, certification or accreditation inspections, or other specialized work.

1.1.6 Contractor

The Contractor is the person or entity with whom the Owner has entered into the Contract for Construction. The term "Contractor" means the Contractor or the Contractor's authorized representative.

1.1.7 Subcontractor and Lower-tier Subcontractor

A Subcontractor is a person or organization who has a contract with the Contractor to perform any of the Work. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or its authorized representative. The term "Subcontractor" also is applicable to those furnishing materials to be incorporated in the Work whether work performed is at the Owner's site or off site, or both. A lower-tier Subcontractor is a person or organization who has a contract with a Subcontractor or another lower-tier

Subcontractor to perform any of the Work at the site. Nothing contained in the Contract Documents shall create contractual relationships between the Owner or the Architect and any Subcontractor or lower-tier Subcontractor of any tier.

1.1.8 Supplier Diversity Definitions

Businesses that fall into the Supplier Diversity classification shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more diverse suppliers as described below.

.1 Minority Business Enterprises (MBE)

Minority Business Enterprise [MBE] shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more minorities as defined below or, in the case of any publicly-owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more minorities as defined below, and whose management and daily business operations are controlled by one (1) or more minorities as defined herein.

.1.1 "African Americans", which includes persons having origins in any of the black racial groups of Africa.

.1.2 "Hispanic Americans", which includes persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

.1.3 "Native Americans", which includes persons of American Indian, Eskimo, Aleut, or Native Hawaiian origin.

.1.4 "Asian-Pacific Americans", which includes persons whose origins are from Japan, China, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Samoa, Guam, the U.S. Trust Territories of the Pacific, or the Northern Marianas.

.1.5 "Asian-Indian Americans", which includes persons whose origins are from India, Pakistan, or Bangladesh.

.2 Women Business Enterprise (WBE)

Women Business Enterprise [WBE] shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more women or, in the case of any publicly owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more women, and whose management and daily business operations are controlled by one (1) or more women.

.3 Veteran Owned Business

Veteran Owned Business shall mean an approved certified business concern which is at least fifty-one percent (51%) owned and controlled by one (1) or more Veterans or, in the case of any publicly owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more Veterans, and whose management and daily business operations are controlled by one (1) or more Veterans. Veterans must be certified by the appropriate federal agency responsible for veterans' affairs.

.4 Service-Disabled Veteran Enterprise (SDVE)

Service-Disabled Veteran Enterprise (SDVE) shall mean a business certified by the State of Missouri Office of Administration as a Service-Disabled Veteran Enterprise, which is at least fifty-one percent (51%) owned and controlled by one (1) or more Served-Disabled Veterans or, in the case of any publicly-owned business, in which at least fifty-one percent (51%) of the stock of which is owned by one (1) or more Service-Disabled Veterans, and whose management and daily business operations are controlled by one (1) or more Served-Disabled Veterans.

.5 Disadvantaged Business Enterprise (DBE)

A Disadvantaged Business Enterprise (DBE) is a for-profit small business concern where a socially and economically disadvantaged individual owns at least 51% interest and also controls management and daily business operations. These firms can and also be referred to as Small Disadvantaged Businesses (SDB). Eligibility requirements for certification are stated in 49 CFR (Code of Federal Regulations), part 26, Subpart D.

U.S. citizens that are African Americans, Hispanics, Native Americans, Asian-Pacific and Subcontinent Asian Americans, and women are presumed to be socially and economically disadvantaged. Also recognized as DBE's are Historically Black Colleges and Universities (HBCU) and small businesses located in Federal HUB Zones.

To be regarded as economically disadvantaged, an individual must have a personal net worth that does not exceed \$1.32 million. To be seen as a small business, a firm must meet Small Business Administration (SBA) size criteria (500 employees or less) and have average annual gross receipts not to exceed \$22.41 million. To be considered a DBE/SDB, a small business owned and controlled by socially and/or economically disadvantaged individuals must receive DBE certification from one of the recognized Missouri state agencies to be recognized in this classification.

1.1.9 Work

Work shall mean supervision, labor, equipment, tools, material, supplies, incidentals operations and activities required by the Contract Documents or reasonably inferable by Contractor therefrom as necessary to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner, and in the best manner known to each respective trade.

1.1.10 Approved

The terms "approved", "equal to", "directed", "required", "ordered", "designated", "acceptable", "compliant", "satisfactory", and similar words or phrases will be understood to have reference to action on the part of the Architect and/or the Owner's Representative.

1.1.11 Contract Documents

The Contract Documents consist of (1) the executed Contract for Construction, (2) these General Conditions of

the Contract for Construction, (3) any Supplemental Conditions or Special Conditions identified in the Contract for Construction, (4) the Specifications identified in the Contract for Construction, (5) the Drawings identified in the Contract for Construction, (6) Addenda issued prior to the receipt of bids, (7) Contractor's bid addressed to Owner, including Contractor's completed Qualification Statement, (8) Contractor's Performance Bond and Contractor's Payment Bond, (9) Notice to Proceed, (10) and any other exhibits and/or post bid adjustments identified in the Contract for Construction, (11) Advertisement for Bid, (12) Information for Bidders, and (13) Change Orders issued after execution of the Contract. All other documents and technical reports and information are not Contract Documents, including without limitation, Shop Drawings, and Submittals.

1.1.12 Contract

The Contract Documents form the Contract and are the exclusive statement of agreement between the parties. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Owner and a Subcontractor or any lower-tier Subcontractor.

1.1.13 Change Order

The Contract may be amended or modified without invalidating the Contract, only by a Change Order, subject to the limitations in Article 7 and elsewhere in the Contract Documents. A Change Order is a written instrument signed by the Owner and the Contractor stating their agreement to a change in the Work, the amount of the adjustment to the Contract Sum, if any, and the extent of the adjustment to the Contract Time, if any. Agreement to any Change Order shall constitute a final settlement of all matters relating to the change in the work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments of the Contract sum, time and schedule.

1.1.14 Substantial Completion

The terms "Substantial Completion" or "substantially complete" as used herein shall be construed to mean the completion of the entire Work, including all submittals required under the Contract Documents, except minor items which in the opinion of the Architect, and/or the Owner's Representative will not interfere with the complete and satisfactory use of the facilities for the purposes intended.

1.1.15 Final Completion

The date when all punch list items are completed, including all closeout submittals and approval by the Architect is given to the Owner in writing.

1.1.16 Supplemental and Special Conditions

The terms "Supplemental Conditions" or "Special Conditions" shall mean the part of the Contract Documents

which amend, supplement, delete from, or add to these General Conditions.

1.1.17 Day

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

1.1.18 Knowledge.

The terms "knowledge," "recognize" and "discover" their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows or should know, recognizes, or should recognize and discovers or should discover in exercising the care, skill, and diligence of a diligent and prudent contractor familiar with the work. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a diligent and prudent contractor familiar with the work.

1.1.19 Punch List

"Punch List" means the list of items, prepared in connection with the inspection(s) of the Project by the Owner's Representative or Architect in connection with Substantial Completion of the Work or a portion of the Work, which the Owner's Representative or Architect has designated as remaining to be performed, completed, or corrected before the Work will be accepted by the Owner.

1.1.20 Public Works Contracting Minimum Wage

The public works contracting minimum wage shall be equal to one hundred twenty percent of the average hourly wage in a particular locality, as determined by the Missouri economic research and information center within the department of economic development, or any successor agency.

1.1.21 Force Majeure

An event or circumstance that could not have been reasonably anticipated and is out of the control of both the Owner and the Contractor.

1.2 Specifications and Drawings

1.2.1 The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction system, standards and workmanship and performance of related services for the Work identified in the Contract for Construction. Specifications are separated into titled divisions for convenience of reference only. 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. Such separation will not operate to make the Owner or the Architect an arbiter of labor disputes or work agreements.

1.2.2 The drawings herein referred to, consist of drawings prepared by the Architect and are enumerated in the Contract Documents.

1.2.3 Drawings are intended to show general arrangements, design, and dimensions of work and are partly diagrammatic. Dimensions shall not be determined by scale or rule. If figured dimensions are lacking, they shall be supplied by the Architect on the Contractor's written request to the Owner's Representative.

1.2.4 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 complimentary, 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 intended results.

1.2.5 In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes and ordinances, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement; either or both in accordance with the Owner's Representative's interpretation. On the Drawings, given dimensions shall take precedence over scaled measurements and large-scale drawings over small scale drawings. Before ordering any materials or doing any Work, the Contractor and each Subcontractor shall verify measurements at the Work site and shall be responsible for the correctness of such measurements. Any difference which may be found shall be submitted to the Owner's Representative and Architect for resolution before proceeding with the Work. If a minor change in the Work is found necessary due to actual field conditions, the Contractor shall submit detailed drawings of such departure for the approval by the Owner's Representative and Architect before making the change.

1.2.6 Data in the Contract Documents concerning lot size, ground elevations, present obstructions on or near the site, locations and depths of sewers, conduits, pipes, wires, etc., position of sidewalks, curbs, pavements, etc., and nature of ground and subsurface conditions have been obtained from sources the Architect believes reliable, but the Architect and Owner do not represent or warrant that this information is accurate or complete. The Contractor shall verify such data to the extent possible through normal construction procedures, including but not limited to contacting utility owners and by prospecting.

1.2.7 Only work included in the Contract Documents is authorized, and the Contractor shall do no work other than that described therein.

1.2.8 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become familiar with local conditions under which the Work is to be

performed and correlated personal observations with requirements of the Contract Documents. Contractor represents that it has performed its own investigation and examination of the Work site and its surroundings and satisfied itself before entering into this Contract as to:

- .1 conditions bearing upon transportation, disposal, handling, and storage of materials;
- .2 the availability of labor, materials, equipment, water, electrical power, utilities and roads;
- .3 uncertainties of weather, river stages, flooding and similar characteristics of the site;
- .4 conditions bearing upon security and protection of material, equipment, and Work in progress;
- .5 the form and nature of the Work site, including the surface and sub-surface conditions;
- .6 the extent and nature of Work and materials necessary for the execution of the Work and the remedying of any defects therein; and
- .7 the means of access to the site and the accommodations it may require and, in general, shall be deemed to have obtained all information as to risks, contingencies and other circumstances.
- .8 the ability to complete work without disruption to normal campus activities, except as specifically allowed in the contract documents.

The Owner assumes no responsibility or liability for the physical condition or safety of the Work site or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.

1.2.9 Drawings, specifications, and copies thereof furnished by the Owner are and shall remain the Owner's property. They are not to be used on another project and, with the exception of one contract set for each party to the Contract, shall be returned to the Owner's Representative on request, at the completion of the Work.

1.3 Required Provisions Deemed Inserted

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

**ARTICLE 2
OWNER**

2.1 Information and Services Required of Owner

2.1.1 Permits and fees are the responsibility of the Contractor under the Contract Documents, unless specifically stated in the contract documents that the Owner will secure and pay for specific necessary approvals, easements, assessments, and charges required for construction, use or occupancy of permanent structures, or for permanent changes in existing facilities.

2.1.2 When requested in writing by the Contractor, information or services under the Owner's control, which are reasonably necessary to perform the Work, will be furnished by the Owner with reasonable promptness to avoid delay in the orderly progress of the Work.

2.2 Owner's Right to Stop the Work

2.2.1 If the Contractor fails to correct Work which is not in strict accordance with the requirements of the Contract Documents or fails to carry out Work in strict accordance with the Contract Documents, the Owner's Representative may order 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 will 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. Owner's lifting of Stop Work Order shall not prejudice Owner's right to enforce any provision of this Contract.

2.3 Owner's Right to Carry Out the Work

2.3.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven (7) day period after receipt of a written notice from the Owner to correct such default or neglect, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. In such case, an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default or neglect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Owner. However, such notice shall be waived in the event of an emergency with the potential for property damage or the endangerment of students, faculty, staff, the public or construction personnel, at the sole discretion of the Owner.

2.3.2 In the event the Contractor has not satisfactorily completed all items on the Punch List within thirty (30) days of its receipt, the Owner reserves the right to complete the Punch List without further notice to the Contractor or its surety. In such case, Owner shall be entitled to deduct from payments then or thereafter due the Contractor the cost of completing the Punch List items, including compensation for the Architect's additional services. If payments then or

thereafter due Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to Owner.

2.4 Extent of Owner Rights

2.4.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (1) granted in the Contract Documents, (2) at law or (3) in equity.

2.4.2 In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

ARTICLE 3 CONTRACTOR

3.1 Contractor's Warranty

3.1.1 The Contractor warrants all equipment and materials furnished, and work performed, under this Contract, against defective materials and workmanship for a period of twelve months after acceptance as provided in this Contract, unless a longer period is specified, regardless of whether the same were furnished or performed by the Contractor or any Subcontractors of any tier. Upon written notice from the Owner of any breach of warranty during the applicable warranty period due to defective material or workmanship, the affected part or parts thereof shall be repaired or replaced by the Contractor at no cost to the Owner. Should the Contractor fail or refuse to make the necessary repairs, replacements, and tests when requested by the Owner, the Owner may perform, or cause the necessary work and tests to be performed, at the Contractor's expense, or exercise the Owner's rights under Article 14.

3.1.2 Should one or more defects mentioned above appear within the specified period, the Owner shall have the right to continue to use or operate the defective part or apparatus until the Contractor makes repairs or replacements or until such time as it can be taken out of service without loss or inconvenience to the Owner.

3.1.3 The above warranties are not intended as a limitation but are in addition to all other express warranties set forth in this Contract and such other warranties as are implied by law, custom, and usage of trade. The Contractor, and its surety or sureties, if any, shall be liable for the satisfaction and full performance of the warranties set forth herein.

3.1.4 Neither the final payment nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the Owner, nor expiration of warranty stated herein, will constitute an acceptance of Work not

done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any responsibility for non-conforming work. The Contractor shall immediately remedy any defects in the Work and pay for any damage to other Work resulting therefrom upon written notice from the Owner. Should the Contractor fail or refuse to remedy the non-conforming work, the Owner may perform, or cause to be performed the work necessary to bring the work into conformance with the Contract Documents at the Contractor's expense.

3.1.5 The Contractor agrees to defend, indemnify, and save harmless The Curators of the University of Missouri, their Officers, Agents, Employees and Volunteers, from and against all loss or expense from any injury or damages to property of others suffered or incurred on account of any breach of the aforesaid obligations and covenants. The Contractor agrees to investigate, handle, respond to and provide defense for and defend against any such liability, claims, and demands at the sole expense of the Contractor, or at the option of the University, agrees to pay to or reimburse the University for the defense costs incurred by the University in connection with any such liability claims, or demands. The parties hereto understand and agree that the University is relying on and does not waive or intend to waive by any provision of this Contract, any monetary limitations or any other rights, immunities, and protections provided by the State of Missouri, as from time to time amended, or otherwise available to the University, or its officers, employees, agents or volunteers.

3.2 Compliance with Laws, Regulations, Permits, Codes, and Inspections

3.2.1 The Contractor shall, without additional expense to the Owner, comply with all applicable laws, ordinances, rules, permit requirements, codes, statutes, and regulations (collectively referred to as "Laws").

3.2.2 Since the Owner is an instrumentality of the State of Missouri, municipal, or political subdivision, ordinances, zoning ordinances, and other like ordinances are not applicable to construction on the Owner's property, and the Contractor will not be required to submit plans and specifications to any municipal or political subdivision authority to obtain construction permits or any other licenses or permits from or submit to, inspection by any municipality or political subdivision relating to the construction on the Owner's property, unless required by the Owner in these Contract Documents or otherwise in writing.

3.2.3 All fees, permits, inspections, or licenses required by municipality or political subdivision for operation on property not belonging to the Owner, shall be obtained by and paid for by the Contractor. The Contractor, of its own expense, is responsible to ensure that all inspections required by said permits or licenses on property, easements, or utilities not belonging to the Owner are conducted as required therein. All connection charges, assessments or transportation fees as may be imposed by any utility company or others are

included in the Contract Sum and shall be the Contractor's responsibility, as stated in 2.1.1 above.

3.2.4 If the Contractor has knowledge that any Contract Documents are at variance with any Laws, including Americans with Disabilities Act – Standards for Accessible Design, ordinances, rules, regulations, or codes applying to the Work, Contractor shall promptly notify the Architect and the Owner's Representative, in writing, and any necessary changes will be adjusted as provided in the Contract Documents. However, it is not the Contractor's primary responsibility to ascertain that the Contract Documents are in accordance with applicable Laws, unless such Laws bear upon performance of the Work.

3.3 Anti-Kickback

3.3.1 No member or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

3.3.2 No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract or any Subcontract of any tier in connection with the construction of the Work shall have a financial interest in this Contract or in any part thereof, any material supply contract, Subcontract of any tier, insurance contract, or any other contract pertaining to the Work.

3.4 Supervision and Construction Procedures

3.4.1 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. The Contractor shall supply sufficient and competent supervision and personnel, and sufficient material, plant, and equipment to prosecute the Work with diligence to ensure completion thereof within the time specified in the Contract Documents, and shall pay when due any laborer, Subcontractor of any tier, or supplier.

3.4.2 The Contractor, if an individual, shall give the Work an adequate amount of personal supervision, and if a partnership or corporation or joint venture the Work shall be given an adequate amount of personal supervision by a partner or executive officer, as determined by the Owner's Representative.

3.4.3 The Contractor and each of its Subcontractors of any tier shall submit to the Owner such schedules of quantities and costs, progress schedules in accordance

with 3.17.2 of this document, payrolls, reports, estimates, records, and other data as the Owner may request concerning Work performed or to be performed under the Contract.

3.4.4 The Contractor shall be represented at the site by a competent superintendent from the beginning of the Work until its final acceptance, whenever contract work is being performed, unless otherwise permitted in writing by the Owner's Representative. The superintendent for the Contractor shall exercise general supervision over the Work and such superintendent shall have decision making authority of the Contractor. Communications given to the superintendent shall be binding as if given to the Contractor. The superintendent shall not be changed by the contractor without approval from the Owner's Representative.

3.4.5 The Contractor shall establish and maintain a permanent benchmark to which access may be had during progress of the Work, and Contractor shall establish all lines and levels, and shall be responsible for the correctness of such. Contractor shall be fully responsible for all layout work for the proper location of Work in strict accordance with the Contract Documents.

3.4.6 The Contractor shall establish and be responsible for wall and partition locations. If applicable, separate contractors shall be entitled to rely upon these locations and for setting their sleeves, openings, or chases.

3.4.7 The Contractor's scheduled outage/tie-in plan, time, and date for any utilities is subject to approval by the Owner's Representative. Communication with the appropriate entity and planning for any scheduled outage/tie-in of utilities shall be the responsibility of the Contractor. Failure of Contractor to comply with the provisions of this Paragraph shall cause Contractor to forfeit any right to an adjustment of the Contract Sum or Contract Time for any postponement, rescheduling or other delays ordered by Owner in connection with such Work. The Contractor shall follow the following procedures for all utility outages/tie-ins or disruption of any building system:

- .1** All shutting of valves, switches, etc., shall be by the Owner's personnel.
- .2** Contractor shall submit its preliminary outage/tie-in schedule with its baseline schedule.
- .3** The Contractor shall request an outage/tie-in meeting at least two weeks before the outage/tie-in is required.
- .4** The Owner's Representative will schedule an outage/tie-in meeting at least one week prior to the outage/tie-in.

3.4.8 The Contractor shall coordinate all Work so there shall be no prolonged interruption of existing utilities, systems, and equipment of Owner. Any existing plumbing, heating, ventilating, air conditioning, or electrical disconnection necessary, which affect portions of this construction or building or any other building, must be scheduled with the Owner's Representative to avoid any

disruption of operation within the building under construction or other buildings or utilities. In no case shall utilities be left disconnected at the end of a workday or over a weekend. Any interruption of utilities, either intentionally or accidentally, shall not relieve the Contractor from repairing and restoring the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

3.4.9 The Contractor shall be responsible for repair of damage to property on or off the project occurring during construction of project, and all such repairs shall be made to meet code requirements or to the satisfaction of the Owner's Representative if code is not applicable.

3.4.10 The Contractor shall be responsible for all shoring required to protect its work or adjacent property and shall pay for any damage caused by failure to shore or by improper shoring or by failure to give proper notice. Shoring shall be removed only after completion of permanent supports.

3.4.11 The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for students, faculty, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

3.4.12 During the performance of the Work, the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences, and other devices appropriately located on site which shall give proper and understandable warning to all persons of danger of entry onto land, structure, or equipment, within the limits of the Contractor's work area.

3.4.13 The Contractor shall pump, bail, or otherwise keep any general excavations free of water. The Contractor shall keep all areas free of water before, during and after concrete placement. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials installed, or to be installed by him.

3.4.14 The Contractor shall be responsible for care of the Work and must protect same from damage of defacement until acceptance by the Owner. All damaged or defaced Work shall be repaired or replaced to the Owner's satisfaction, without cost to the Owner.

3.4.15 When requested by the Owner's Representative, the Contractor, at no extra charge, shall provide scaffolds

or ladders in place as may be required by the Architect or the Owner for examination or inspection of Work in progress or completed.

3.4.16 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors of any tier and their agents and employees, and any entity or other persons performing portions of the Work.

3.4.17 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 Owner's Representative or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

3.4.18 The Contractor shall be responsible for inspection of portions of the Work already performed under this Contract to determine that such portions are compliant and in proper condition to receive subsequent Work.

3.5 Use of Site

3.5.1 The Contractor shall limit operations and storage of material to the area within the Work limit lines shown on Drawings, except as necessary to connect to existing utilities, shall not encroach on neighboring property, and shall exercise caution to prevent damage to existing structures.

3.5.2 Only materials and equipment, which are to be used directly in the Work, shall be brought to and stored on the Work site by the Contractor. After equipment is no longer required for the Work, it shall be promptly removed from the Work site. Protection of construction materials and equipment stored at the Work site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

3.5.3 No project signs shall be erected without the written approval of the Owner's Representative.

3.5.4 The Contractor shall ensure that the Work is at all times performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. Particular attention shall be paid to access for emergency vehicles, including fire trucks. Wherever there is the possibility of interfering with normal emergency vehicle operations, Contractor shall obtain permission from both campus and municipal emergency response entities prior to limiting any access. The Work shall be performed, to the fullest extent reasonably possible, in such a manner that public areas adjacent to the site of the Work shall be free from all debris, building materials and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Contract Documents, Contractor shall not interfere with the occupancy or beneficial use of (1) any areas and buildings adjacent to the site of the Work or (2) the Work in the event of partial occupancy. Contractor shall assume full responsibility for any damage to the property

comprising the Work or to the owner or occupant of any adjacent land or areas resulting from the performance of the Work.

3.5.5 The Contractor shall not permit any workers to use any existing facilities at the Work site, including, without limitation, lavatories, toilets, entrances, and parking areas other than those designated by Owner. The Contractor, Subcontractors of any tier, suppliers and employees shall comply with instructions or regulations of the Owner's Representative governing access to, operation of, and conduct while in or on the premises and shall perform all Work required under the Contract Documents in such a manner as not to unreasonably interrupt or interfere with the conduct of Owner's operations. Any request for Work, a suspension of Work or any other request or directive received by the Contractor from occupants of existing buildings shall be referred to the Owner's Representative for determination.

3.5.6 The Contractor and the Subcontractor of any tier shall have its' name, acceptable abbreviation or recognizable logo and the name of the city and state of the mailing address of the principal office of the company, on each motor vehicle and motorized self-propelled piece of equipment which is used in connection with the project. The signs are required on such vehicles during the time the Contractor is working on the project.

3.6 Review of Contract Documents and Field Conditions by Contractor

3.6.1 The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Architect and Owner and shall at once report in writing to the Architect and Owner's Representative any errors, inconsistencies or omissions discovered. If the Contractor performs any construction activity which it knows or should have known involves a recognized error, inconsistency, or omission in the Contract Documents without such written notice to the Architect and Owner's Representative, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.6.2 The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported in writing to the Architect and Owner's Representative within twenty-four (24) hours. During the progress of work, Contractor shall verify all field measurements prior to fabrication of building components or equipment and proceed with the fabrication to meet field conditions. Contractor shall consult all Contract Documents to determine the exact location of all work and verify spatial relationships of all work. Any question concerning said

location or spatial relationships shall be submitted to the Owner's Representative. Specific locations for equipment, pipelines, ductwork and other such items of work, where not dimensioned on plans, shall be determined in consultation with Owner's Representative and Architect. Contractor shall be responsible for the proper fitting of the Work in place.

3.6.3 The Contractor shall provide, at the proper time, such material as required for support of the Work. If openings or chases are required, whether shown on Drawings or not, the Contractor shall see they are properly constructed. If required openings or chases are omitted, the Contractor shall cut them at the Contractors own expense, but only as directed by the Architect, through the Owner Representative.

3.6.4 Should the Contract Documents fail to particularly describe materials or goods to be used, it shall be the duty of the Contractor to inquire of the Architect and the Owner's Representative what is to be used and to supply it at the Contractor's expense, or else thereafter replace it to the Owner's Representative's satisfaction. At a minimum, the Contractor shall provide the quality of materials as generally specified throughout the Contract Documents.

3.7 Cleaning and Removal

3.7.1 The Contractor shall keep the Work site and surrounding areas free from accumulation of waste materials, rubbish, debris, and dirt resulting from the Work and shall clean the Work site and surrounding areas as requested by the Architect and the Owner's Representative, including mowing of grass greater than 6 inches high. The Contractor shall be responsible for the cost of clean up and removal of debris from premises. The building and premises shall be kept clean, safe, in a workmanlike manner, and in compliance with OSHA standards and code at all times. At completion of the Work, the Contractor shall remove from and about the Work site tools, construction equipment, machinery, fencing, and surplus materials. Further, at the completion of the work, all dirt, stains, and smudges shall be removed from every part of the building, all glass in doors and windows shall be washed, and entire Work shall be left broom clean in a finished state ready for occupancy. The Contractor shall advise his Subcontractors of any tier of this provision, and the Contractor shall be fully responsible for leaving the premises in a finished state ready for use to the satisfaction of the Owner's Representative. If the Contractor fails to comply with the provisions of this paragraph, the Owner may do so, and the cost thereof shall be charged to the Contractor.

3.8 Cutting and Patching

3.8.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly.

3.8.2 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

such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

3.8.3 If the Work involves renovation and/or alteration of existing improvements, Contractor acknowledges that cutting and patching of the Work is essential for the Work to be successfully completed. Contractor shall perform any cutting, altering, patching, and/or fitting of the Work necessary for the Work and the existing improvements to be fully integrated and to present the visual appearance of an entire, completed, and unified project. In performing any Work which requires cutting or patching, Contractor shall use its best efforts to protect and preserve the visual appearance and aesthetics of the Work to the reasonable satisfaction of both the Owner's Representative and Architect.

3.9 Indemnification

3.9.1 To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, the Architect, Architect's consultants, and the agents, employees, representatives, insurers and re-insurers of any of the foregoing (hereafter collectively referred to as the "Indemnitees") from and against claims, damages (including loss of use of the Work itself), punitive damages, penalties and civil fines unless expressly prohibited by law, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from performance of the Work to the extent caused in whole or in part by negligent acts or omissions or other fault of Contractor, a Subcontractor of any tier, or 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 the negligent acts or omissions or other fault of a party indemnified hereunder. The Contractor's obligations hereunder are in addition to and shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that the Owner may possess. If one or more of the Indemnitees demand performance by the Contractor of obligations under this paragraph or other provisions of the Contract Documents and if Contractor refuses to assume or perform, or delays in assuming or performing Contractor's obligations, Contractor shall pay each Indemnitee who has made such demand its respective attorneys' fees, costs, and other expenses incurred in enforcing this provision. The defense and indemnity required herein shall be a binding obligation upon Contractor whether or not an Indemnitee has made such demand. Even if a defense is successful to a claim or demand for which Contractor is obligated to indemnify the Indemnitees from under this Paragraph, Contractor shall remain liable for all costs of defense.

3.9.2 The indemnity obligations of Contractor under this Section 3.9 shall survive termination of this Contract or final payment thereunder. In the event of any claim or demand made against any party which is entitled to be indemnified hereunder, the Owner may in its sole discretion reserve, return or apply any monies due or to become due the Contractor under the Contract for the purpose of resolving such claims; provided, however, that the Owner may release such funds if the Contractor provides the Owner with reasonable assurance of protection of the Owner's interests. The Owner shall in its sole discretion determine if such assurances are reasonable. Owner reserves the right to control the defense and settlement of any claim, action or proceeding which Contractor has an obligation to indemnify the Indemnitees against under Paragraph 3.9.1.

3.9.3 In claims against any person or entity indemnified under this Section 3.9 by an employee of the Contractor, a Subcontractor of any tier, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.9 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor of any tier under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

3.9.4 The obligations of the Contractor under Paragraph 3.9.1 shall not extend to the liability of the Architect, his agents or employees, arising out of the preparation and approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

3.10 Patents

3.10.1 The Contractor shall hold and save harmless the Owner and its officers, agents, servants, and employees from liability of any nature or kind, including cost and expense, for, or on account of, any patented or otherwise protected invention, process, article, or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless otherwise specifically stipulated in the Contract Documents.

3.10.2 If the Contractor uses any design, device, or material covered by letters patent or copyright, he shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device, or material. It is mutually agreed and understood, without exception, that the Contract Sum include, and the Contractor shall pay all royalties, license fees or costs arising from the use of such design, device, or material in any way involved in the Work. The Contractor and/or sureties shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of such patented or copyrighted design, device, or material or any trademark or copyright in connection with Work agreed to be performed under this Contract and shall indemnify the Owner for any cost, expense, or damage it may be obligated to pay by reason of

such infringement at any time during the prosecution of the Work or after completion of the Work.

3.11 Delegated Design

3.11.1 If the Contract Documents specify the Contractor is responsible for the design of any work as part of the project, then the Contractor shall procure all design services and certifications necessary to complete the Work as specified, from a design professional licensed in the State of Missouri. The signature and seal of that design professional shall appear on all drawings, calculations, specifications, certifications, shop drawings, and other submittals related to the Work. The design professional shall maintain insurance as required per Article 11.

3.12 Materials, Labor, and Workmanship

3.12.1 Materials and equipment incorporated into the Work shall strictly conform to the Contract Documents and representations and approved Samples provided by Contractor and shall be of the most suitable grade of their respective kinds for their respective uses and shall be fit and sufficient for the purpose intended, merchantable, of good new material and workmanship, and free from defect. Workmanship shall be in accordance with the highest standard in the industry and free from defect in strict accordance with the Contract Documents.

3.12.2 Materials and fixtures shall be new and of latest design unless otherwise specified and shall provide the most efficient operating and maintenance costs to the Owner. All Work shall be performed by competent workers and shall be of best quality.

3.12.3 The Contractor shall carefully examine the Contract Documents and shall be responsible for the proper fitting of his material, equipment, and apparatus into the building.

3.12.4 The Contractor shall base his bid only on the Contract Documents.

3.12.5 Materials and workmanship shall be subject to inspection, examination, and testing by the Architect and the Owner's Representative at any and all times during manufacture, installation, and construction of any of them, at places where such manufacture, installation, or construction is performed.

3.12.6 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

3.12.7 Unless otherwise specifically noted, the Contractor shall provide and pay for supervision, labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for the proper execution and completion of the Work.

3.12.8 Substitutions

3.12.8.1 A substitution is a Contractor proposal of an alternate product or method in lieu of what has been specified or shown in the Contract Documents, which is not an "or equal" as set forth in Section 3.12.1.

3.12.8.2 Contractor may make a proposal to the Architect and the Owner's Representative to use substitute products or methods as set forth herein, but the Architect's and the Owner's Representative's decision concerning acceptance of a substitute shall be final. The Contractor must do so in writing and setting forth the following:

- .1** Full explanation of the proposed substitution and submittal of all supporting data including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution.
- .2** Reasons the substitution is advantageous and necessary, including the benefits to the Owner and the Work in the event the substitution is acceptable.
- .3** The adjustment, if any, in the Contract Sum, in the event the substitution is acceptable.
- .4** The adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable.
- .5** An affidavit stating that (a) the proposed substitution conforms to and meets all of the Contract Document requirements and is code compliant, except as specifically disclosed and set forth in the affidavit and (b) the Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be submitted to the Architect and Owner's Representative in sufficient time to allow the Architect and Owner's Representative no less than ten (10) working days for review. No substitution will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated herein.

3.12.8.3 Substitutions may be rejected without explanation at the Owner's sole discretion and will be considered only under one or more of the following conditions:

- .1** Required for compliance with interpretation of code requirements or insurance regulations then existing;
- .2** Unavailability of specified products, through no fault of the Contractor;
- .3** Material delivered fails to comply with the Contract Documents;
- .4** Subsequent information discloses inability of specified products to perform properly or to fit in designated space;

- .5 Manufacturer/fabricator refuses to certify or guarantee performance of specified product as required; or
- .6 When in the judgment of the Owner or the Architect, a substitution would be substantially to the Owner's best interests, in terms of cost, time, or other considerations.

3.12.8.4 Whether or not any proposed substitution is accepted by the Owner or the Architect, the Contractor shall reimburse the Owner for any fees charged by the Architect or other consultants for evaluating each proposed substitution.

3.13 Approved Equal

3.13.1 Whenever in the Contract Documents any article, appliance, device, or material is designated by the name of a manufacturer, vendor, or by any proprietary or trade name, the words "or approved equal," shall automatically follow and shall be implied unless specifically indicated otherwise. The standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner's Representative and the Architect they are equal in design, appearance, spare parts availability, strength, durability, usefulness, serviceability, operation cost, maintenance cost, and convenience for the purpose intended. Any general listings of approved manufacturers in any Contract Document shall be for informational purposes only and it shall be the Contractor's sole responsibility to ensure that any proposed "or equal" complies with the requirements of the Contract Documents and is code compliant.

3.13.2 The Contractor shall submit to Architect and Owner's Representative a written and full description of the proposed "or equal" including all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and similar information demonstrating that the proposed "or equal" strictly complies with the Contract Documents. The Architect or Owner's Representative shall take appropriate action with respect to the submission of a proposed "or equal" item. If Contractor fails to submit proposed "or equals" as set forth herein, it shall waive any right to supply such items. The Contract Sum and Contract Time shall not be adjusted as a result of any failure by Contractor to submit proposed "or equals" as provided for herein. All documents submitted in connection with preparing an "or equal" shall be clearly and obviously marked as a proposed "or equal" submission.

3.13.3 No approvals or action taken by the Architect or Owner's Representative shall relieve Contractor from its obligation to ensure that an "or equal" article, appliance, device, or material strictly complies with the requirements of the Contract Documents. Contractor shall not propose "or equal" items in connection with Shop Drawings or

other Submittals, and Contractor acknowledges and agrees that no approvals or action taken by the Architect or Owner's Representative with respect to Shop Drawings or other Submittals shall constitute approval of any "or equal" item or relieve Contractor from its sole and exclusive responsibility. Any changes required in the details and dimensions indicated in the Contract Documents for the incorporation or installation of any "or equal" item supplied by the Contractor shall be properly made and approved by the Architect at the expense of the Contractor. No 'or equal' items will be permitted for components of or extensions to existing systems when, in the opinion of the Architect, the named manufacturer must be provided in order to ensure compatibility with the existing systems, including, but not limited to, mechanical systems, electrical systems, fire alarms, smoke detectors, etc. No action will be taken by the Architect with respect to proposed "or equal" items prior to receipt of bids, unless otherwise noted in the Special Conditions.

3.14 Shop Drawings, Product Data, Samples, and Coordination Drawings/BIM Models

3.14.1 Shop Drawings are drawings, diagrams, schedules, and other data specifically prepared for the Work by the Contractor or a Subcontractor, sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

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

3.14.3 Samples are physical samples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.14.4 Coordination Drawings are drawings for the integration of the Work, including work first shown in detail on shop drawings or product data. Coordination drawings show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated. Coordination Drawings are the responsibility of the contractor and are submitted for informational purposes. The Special Conditions will state whether coordination drawings are required. BIM models may be used for coordination in lieu of coordination drawings at the contractor's discretion, unless required in the Special Conditions. The final coordination drawings/BIM Model will not change the contract documents, unless approved by a fully executed change order describing the specific modifications that are being made to the contract documents.

3.14.5 Shop Drawings, Coordination Drawings/BIM Models, Product Data, Samples and similar submittals (collectively referred to as "Submittals") are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are

required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

3.14.6 The Contractor shall schedule submittal of Shop Drawings and Product Data to the Architect so that no delays will result in delivery of materials and equipment, advising the Architect of priority for checking of Shop Drawings and Product Data, but a minimum of two weeks shall be provided for this purpose. Because time is of the essence in this contract, unless noted otherwise in the Special Conditions or Technical Specifications, all submittals, shop drawings and samples must be submitted as required to maintain the contractor's plan for proceeding but must be submitted within 90 days of the Notice to Proceed. If Contractor believes that this milestone is unreasonable for any submittal, Contractor shall request an extension of this milestone, within 60 days of Notice to Proceed, for each submittal that cannot meet the milestone. The request shall contain a reasonable explanation as to why the 90-day milestone is unrealistic, and shall specify a date on which the submittal will be provided, for approval by the Owner's Representative. Failure of the Contractor to comply with this section may result in delays in the submittal approval process and/or charges for expediting approval, both of which will be the responsibility of the Contractor.

3.14.7 The Contractor, at its own expense, shall submit Samples required by the Contract Documents with reasonable promptness as to cause no delay in the Work or the activities of separate contractors and no later than twenty (20) days before materials are required to be ordered for scheduled delivery to the Work site. Samples shall be labeled to designate material or products represented, grade, place of origin, name of producer, name of Contractor and the name and number of the Owner's project. Quantities of Samples shall be twice the number required for testing so that Architect can return one set of the Samples. Materials delivered before receipt of Architect's approval may be rejected by Architect and in such event, Contractor shall immediately remove all such materials from the Work site. When requested by Architect or Owner's Representative, samples of finished masonry and field applied paints and finishes shall be located as directed and shall include sample panels built at the site of approximately twenty (20) square feet each.

3.14.8 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples, or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.

3.14.9 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents such Submittals strictly comply with the requirements of the Contract Documents and that the

Contractor has determined and verified field measurements and field construction criteria related thereto, that materials are fit for their intended use and that the fabrication, shipping, handling, storage, assembly and installation of all materials, systems and equipment are in accordance with best practices in the industry and are in strict compliance with any applicable requirements of the Contract Documents. Contractor shall also coordinate each Submittal with other Submittals.

3.14.10 Contractor shall be responsible for the correctness and accuracy of the dimensions, measurements and other information contained in the Submittals.

3.14.11 Each Submittal will bear a stamp or specific indication that the Submittal complies with the Contract Documents and Contractor has satisfied its obligations under the Contract Documents with respect to Contractor's review and approval of that Submittal. Each Submittal shall bear the signature of the representative of Contractor who approved the Submittal, together with the Contractor's name, Owner's name, number of the Project, and the item name and specification section number.

3.14.12 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals. 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. Specifically, but not by way of limitation, Contractor acknowledges that Architect's approval of Shop Drawings shall not relieve Contractor for responsibility for errors and omissions in the Shop Drawings since Contractor is responsible for the correctness of dimensions, details and the design of adequate connections and details contained in the Shop Drawings.

3.14.13 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.

3.14.14 The Contractor represents and warrants that all Shop Drawings shall be prepared by persons and entities possessing expertise and experience in the trade for which the Shop Drawing is prepared and, if required by the Architect or applicable Laws, by a licensed engineer or other design professional.

3.15 Record Drawings

3.15.1 The Contractor shall maintain a set of Record Drawings on site in good condition and shall use colored pencils to mark up said set with "record information" in a legible manner to show: (1) bidding addendums, (2) executed change orders, (3) deviations from the Drawings made during construction; (4) details in the Work not previously shown; (5) changes to existing conditions or existing conditions found to differ from those shown on any existing drawings; (6) the actual installed position of equipment, piping, conduits, light switches, electric fixtures, circuiting, ducts, dampers, access

panels, control valves, drains, openings, and stub-outs; and (7) such other information as either Owner or Architect may reasonably request. The prints for Record Drawing use will be a set of "blue line" prints provided by Architect to Contractor at the start of construction. Upon Substantial Completion of the Work, Contractor shall deliver all Record Drawings to Owner and Architect for approval. If not approved, Contractor shall make the revisions requested by Architect or Owner's Representative. Final payment and any retainage shall not be due and owing to Contractor until the final Record Drawings marked by Contractor as required above are delivered to Owner.

3.16 Operating Instructions and Service Manuals

3.16.1 The Contractor shall submit four (4) volumes of operating instructions and service manuals to the Architect before completing 50% of the adjusted contract amount. Payments beyond 50% of the adjusted contract amount may be withheld until all operating instructions and service manuals are received. The operating instructions and service manuals shall contain:

- .1** Start-up and Shutdown Procedures: Provide a step-by-step write up of all major equipment. When manufacturer's printed start-up, trouble shooting and shut-down procedures are available, they may be incorporated into the operating manual for reference.
- .2** Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.
- .3** Equipment List: List of all major equipment as installed shall include model number, capacities, flow rate, and name-plate data.
- .4** Service Instructions: The Contractor shall be required to provide the following information for all pieces of equipment.
 - (a)** Recommended spare parts including catalog number and name of local suppliers or factory representative.
 - (b)** Belt sizes, types, and lengths.
 - (c)** Wiring diagrams.
- .5** Manufacturer's Certificate of Warranty: Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year from the date of Substantial Completion. Where longer period is required by the Contract Documents, the longer period shall govern.
- .6** Parts catalogs: For each piece of equipment furnished, a parts catalog or similar document shall be provided which identifies the components by number for replacement ordering.

3.16.2 Submission

- .1** Manuals shall be bound into volumes of standard 8 1/2" x 11" hard binders. Large drawings too bulky to be folded into 8 1/2" x 11" shall be separately bound or folded and in brown

envelopes, cross-referenced and indexed with the manuals.

- .2** The manuals shall identify the Owner's project name, project number, and include the name and address of the Contractor and major Subcontractors of any tier who were involved with the activity described in that particular manual.

3.17 Taxes

3.17.1 The Contractor shall pay all applicable sales, consumer, use, and similar taxes for the Work which are legally enacted when the bids are received, whether or not yet effective or scheduled to go into effect. However, certain purchases by the Contractor of materials incorporated in or consumed in the Work are exempt from certain sales tax pursuant to RSMo § 144.062. The Contractor shall be issued a Project Tax Exemption Certificate for this Work to obtain the benefits of RSMo § 144.062.

3.17.2 The Contractor shall furnish this certificate to all subcontractors, and any person or entity purchasing materials for the Work shall present such certificate to all material suppliers as authorization to purchase, on behalf of the Owner, all tangible personal property and materials to be incorporated into or consumed in the Work and no other on a tax-exempt basis. Such suppliers shall provide to the purchasing party invoices bearing the name of the exempt entity and the project identification number. Nothing in this section shall be deemed to exempt from any sales or similar tax the purchase of any construction machinery, equipment or tools used in construction, repairing or remodeling facilities for the Owner. All invoices for all personal property and materials purchased under a Project Tax Exemption Certificate shall be retained by the Contractor for a period of five years and shall be subject to audit by the Director of Revenue.

3.17.3 Any excess resalable tangible personal property or materials which were purchased for the project under this Project Tax Exemption Certificate but which were not incorporated into or consumed in the Work shall either be returned to the supplier for credit or the appropriate sales or use tax on such excess property or materials shall be reported on a return and paid by such purchasing party not later than the due date of the purchasing party's Missouri sales or use tax return following the month in which it was determined that the materials were not used in the Work.

3.17.4 If it is determined that sales tax is owed by the Contractor on property and materials due to the failure of the Owner to revise the certificate expiration date to cover the applicable date of purchase, Owner shall be liable for the tax owed.

3.17.5 The Owner shall not be responsible for any tax liability due to Contractor's neglect to make timely orders, payments, etc. or Contractor's misuse of the Project Tax Exemption Certificate. Contractor represents that the Project Tax Exemption Certificate shall be used in accordance with RSMo § 144.062 and the terms of the Project Tax Exemption

Certificate. Contractor shall indemnify the Owner for any loss or expense, including but not limited to, reasonable attorneys' fees, arising out of Contractor's use of the Project Tax Exemption Certificate.

3.18 Contractor's Construction Schedules

3.18.1 The Contractor, within fifteen (15) days after the issuance of the Notice to Proceed, shall prepare and submit for the Owner's and Architect's information Contractor's construction schedule for the Work and shall set forth interim dates for completion of various components of the Work and Work Milestone Dates as defined herein. The schedule shall not exceed time limits current under the Contract Documents, shall be revised on a monthly basis or as requested by the Owner's Representative as required by the conditions of the Work, and shall provide for expeditious and practicable execution of the Work. The Contractor shall conform to the most recent schedule.

3.18.2 The construction schedule shall be in a detailed format satisfactory to the Owner's Representative and the Architect and in accordance with the detailed schedule requirements set forth in this document and the Special Conditions. If the Owner's Representative or Architect has a reasonable objection to the schedule submitted by Contractor, the construction schedule shall be promptly revised by the Contractor. 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.

3.18.3 As time is of the essence to this contract, the University expects that the Contractor will take all necessary steps to ensure that the project construction schedule shall be prepared in accordance with the specific requirements of the Special Conditions to this contract. At a minimum, contractor shall comply with the following:

- .1** The schedule shall be prepared using Primavera P3, Oracle P6, Microsoft Project or other software acceptable to the Owner's Representative.
- .2** The schedule shall be prepared and maintained in CPM format, in accordance with Construction CPM Scheduling, published by the Associated General Contractors of American (AGC).
- .3** Prior to submittal to the Owner's Representative for review, Contractor shall obtain full buy-in to the schedule from all major subcontractors, in writing if so, requested by Owner's Representative.
- .4** Schedule shall be updated, in accordance with Construction CPM Scheduling, published by the AGC, on a monthly basis at minimum, prior to, and submitted with, the monthly pay application or as requested by the Owner's Representative.
- .5** Along with the update the Contractor shall submit a narrative report addressing all changes, delays and impacts, including weather to the schedule

during the last month, and explain how the end date has been impacted by same.

- .6** The submission of the updated schedule certifies that all delays and impacts that have occurred on or to the project during the previous month have been factored into the update and are fully integrated into the schedule and the projected completion date.

Failure to comply with any of these requirements will be considered a material breach of this contract. See Special Conditions for detailed scheduling requirements.

3.18.4 In the event the Owner's Representative or Architect determines that the performance of the Work, as of a Milestone Date, has not progressed or reached the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, facilities, (3) expediting delivery of materials, and (4) other similar measures (hereinafter referred to collectively as Extraordinary Measures). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the construction schedule. The Contractor shall not be entitled to an adjustment in the Contract Sum concerning Extraordinary Measures required by the Owner under or pursuant to this Paragraph 3.17.3. The Owner may exercise the rights furnished the Owner under or pursuant to this Paragraph 3.17.3 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any Milestone Date or completion date set forth in the Contract Documents.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 Rights of the Owner

4.1.1 The Owner's Representative will administer the Construction Contract. The Architect will assist the Owner's Representative with the administration of the Contract as indicated in these Contract Documents.

4.1.2 If, in the judgment of the Owner's Representative, it becomes necessary to accelerate the work, the Contractor, when directed by the Owner's Representative in writing, shall cease work at any point and transfer its workers to such point or points and execute such portions of the work as may be required to enable others to hasten and properly engage and carry out the work, all as directed by the Owner's Representative. The additional cost of accelerating the work, if any, will be borne by the Owner, unless the Contractor's work progress is behind schedule as shown on the most recent progress schedule.

4.1.3 If the Contractor refuses, for any reason, to proceed with what the Owner believes to be contract work, the Owner may issue a Construction Directive, directing the Contractor to proceed. Contractor shall be obligated to promptly proceed with this work. If Contractor feels that it is entitled to additional compensation for this work, it may file a claim for additional compensation and/or time, in accordance with 4.4 of this Document.

4.1.4 The Owner's Representative, may, by written notice, require a Contractor to remove from involvement with the Work, any of Contractor's personnel or the personnel of its Subcontractors of any tier whom the Owner's Representative may deem abusive, incompetent, careless, or a hindrance to proper and timely execution of the Work. The Contractor shall comply with such notice promptly, but without detriment to the Work or its progress.

4.1.5 The Owner's Representative will schedule Work status meetings that shall be attended by representatives of the Contractor and appropriate Subcontractors of any tier. Material suppliers shall attend status meetings if required by the Owner's Representative. These meetings shall include preconstruction meetings.

4.1.6 The Owner does not allow smoking on university property.

4.2 Rights of the Architect

4.2.1 The Architect will interpret requirements of the Contract Documents with respect to the quality, quantity, and other technical requirements of the Work itself within a reasonable time after written request of the Contractor. Contractor shall provide Owner's Representative a copy of such written request.

4.3 Review of the Work

4.3.1 The Architect, the Owner's Representative, and the Owner's Authorized Agent shall, at all times, have access to the Work; and the Contractor shall provide proper and safe facilities for such access.

4.3.2 The Owner's Representative shall have authority to reject Work that does not strictly comply with the requirements of the Contract Documents. Whenever the Owner's Representative considers it necessary or advisable for implementation of the intent of the Contract Documents, Owner's Representative shall have the authority to require additional inspection or testing of the Work, whether or not such Work is fabricated, installed, or completed.

4.3.3 The fact that the Architect or the Owner's Representative observed, or failed to observe, faulty Work, or Work done which is not in accordance with the Contract Documents, regardless of whether or not the Owner has released final payment, shall not relieve the

Contractor from responsibility for all damages and additional costs of the Owner as a result of defective or faulty Work.

4.4 Claims

4.4.1 A Claim is a demand or assertion by Contractor seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or any other relief with respect to the terms of the Contract. The term "Claim(s)" also includes demands and assertions of Contractor arising out of or relating to the Contract Documents, including Claims based upon breach of contract, mistake, misrepresentation, or other cause for Contract Modification or rescission. Claims must be made by written notice. Contractor shall have the responsibility to substantiate Claims.

4.4.2 Claims by Contractor must be made promptly, and no later than within fourteen (14) days after occurrence of the event giving rise to such Claim. Claims must be made by written notice. Such notice shall include a detailed statement setting forth all reasons for the Claim and the amount of additional money and additional time claimed by Contractor. The notice of Claims shall also strictly comply with all other provisions of the Contract Documents. Contractor shall not be entitled to rely upon any grounds or basis for additional money on additional time not specifically set forth in the notice of Claim. All Claims not made in the manner provided herein shall be deemed waived and of no effect. Contractor shall furnish the Owner and Architect such timely written notice of any Claim provided for herein, including, without limitation, those in connection with alleged concealed or unknown conditions, and shall cooperate with the Owner and Architect in any effort to mitigate the alleged or potential damages, delay or other adverse consequences arising out of the condition which is the cause of such a Claim.

4.4.3 Pending final resolution of a Claim, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments that are not in dispute in accordance with the Contract Documents.

4.5 Claims for Concealed or Unknown Conditions

4.5.1 If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or (2) unknown physical conditions of an unusual nature, which 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, then notice by the Contractor shall be given to the Owner's Representative promptly before conditions are disturbed, and in no event later than three (3) days after first observance of the conditions. The Owner's Representative will promptly investigate such conditions. If such conditions differ materially, as provided for above and cause an increase or decrease in the Contractor's cost, or time, required for performance of the Work, an equitable adjustment in the Contract sum or Contract Time, or both, shall be made, subject to the provisions and restrictions set for herein. If the Owner's Representative determines 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 Owner's Representative will so notify the Contractor in writing. If the Contractor disputes the finding of the Owner's Representative that no change in the terms of the Contract terms is justified, Contractor shall proceed with the Work, taking whatever steps are necessary to overcome or correct such conditions so that Contractor can proceed in a timely manner. The Contractor may have the right to file a Claim in accordance with the Contract Documents.

4.5.2 It is expressly agreed that no adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition which does not differ materially from those conditions disclosed or which reasonably should have been disclosed by the Contractor's (1) prior inspections, tests, reviews and preconstruction investigations for the Project, or (2) inspections, tests, reviews and preconstruction inspections which the Contractor had the opportunity to make or should have performed in connection with the Project.

4.6 Claim for Additional Cost

4.6.1 If the Contractor makes a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. In addition to all other requirements for notice of a Claim, said notice shall detail and itemize the amount of all Claims and shall contain sufficient data to permit evaluation of same by Owner.

4.7 Claims for Additional Time

4.7.1 If the Contractor makes a Claim for an increase in the Contract Time, written notice as provided herein shall be given. In addition to other requirements for notice of a Claim, Contractor shall include an estimate of the probable effect of delay upon the progress of the Work, utilizing a CPM Time Impact Schedule Analysis, (TIA) as defined in the AGC Scheduling Manual. In the case of a continuing delay, only one Claim is necessary.

.1 Time extensions will be considered for excusable delays only. That is, delays that are beyond the control and/or contractual responsibility of the Contractor.

4.7.2 If weather days are the basis for a Claim for additional time, such Claim shall be documented by the Contractor by data acceptable to the Owner's Representative substantiating that weather conditions for the period of time in question, had an adverse effect on the critical path of the scheduled construction. Weather days shall be defined as days on which critical path work cannot proceed due to weather conditions (including but not limited to rain, snow, etc.), in excess of the number of days shown on the Anticipated Weather Day schedule in the Special Conditions. To be considered a weather day,

at least four working hours must be lost due to the weather conditions on a critical path scope item for that day.-Weather days and Anticipated weather days listed in the Special Conditions shall only apply to Monday through Friday. A weather day claim cannot be made for Saturdays, Sundays, New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the day after Thanksgiving Day and Christmas Day, unless that specific day was approved in writing for work by the Owner's Representative.

.1 The Contractor must have fulfilled its contract obligations with respect to temporary facilities and protection of its work, and worker protection for hot and cold weather per OSHA guidelines.

.2 If the contract obligations have been satisfied, the Owner will review requests for non-compensable time extensions for critical path activities as follows:

.2.1 If the Contractor cannot work on a critical path activity due to adverse weather, after implementing all reasonable temporary weather protection, the Contractor will so notify the Owner's Representative. Each week, the Contractor will notify the Owner's Representative of the number of adverse weather days that it believes it has experienced in the previous week. As provided in the contract, until such time as the weather days acknowledged by the Owner's Representative exceed the number of days of adverse weather contemplated in the Special Conditions, no request for extension of the contract completion time will be considered.

.2.2 If the Contractor has accumulated in excess of the number of adverse weather days contemplated in the Special Conditions due to the stoppage of work on critical path activities due to adverse weather, the Owner will consider a time extension request from the Contractor that is submitted in accordance with the contract requirements. The Owner will provide a change order extending the time for contract completion or direct an acceleration of the work in accordance with the contract terms and conditions to recover the time lost due to adverse weather in excess of the number of adverse weather working days contemplated in the Special Conditions.

4.7.3 A Force Majeure event or circumstance shall not be the basis of a claim by the Contractor seeking an adjustment in the Contract amount for costs or expenses of any type. With the exception of weather delays which are administered under this Article 4, and notwithstanding other requirements of the Contract, all Force Majeure events resulting in a delay

to the critical path of the project shall be administered as provided in Article 8.

4.7.4 The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment.

4.8 Resolution of Claims and Disputes

4.8.1 The Owner's Representative will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the Contractor, (2) reject the Claim in whole or in part, (3) approve the Claim, or (4) suggest a compromise.

4.8.2 If a Claim has not been resolved, the Contractor shall, within ten days after the Owner's Representative's preliminary response, take one or more of the following actions: (1) submit additional supporting data requested, (2) modify the initial Claim, or (3) notify the Owner's Representative that the initial Claim stands.

4.8.3 If a Claim has not been resolved after consideration of the foregoing and of further information presented by the Contractor, the Contractor has the right to seek administrative review as set forth in Section 4.9. However, Owner's Representative's decisions on matters relating to aesthetics will be final.

4.9 Administrative Review

4.9.1 Claims not resolved pursuant to the procedures set forth in the Contract Documents except with respect to Owner's Representative's decision on matters relating to aesthetic effect, and except for claims which have been waived by the making or acceptance of final payment, or the Contractor's acceptance of payments in full for changes in work may be submitted to administrative review as provided in this section. All requests for administrative review shall be made in writing.

4.9.2 Upon written request from the Contractor, the Owner's Review Administrator authorized by the Campus Contracting Officer will convene a review meeting between the Contractor and Owner's Representative's within fifteen (15) days of receipt of such written request. The Contractor and Owner's Representative will be allowed to present written documentation with respect to the claim(s) before or during the meeting. The Contractor and Owner's Representative will be allowed to present the testimony of any knowledgeable person regarding the claim at the review meeting. The Owner's Review Administrator will issue a written summary of the review meeting and decision to resolve the Claim within fifteen (15) days. If the Contractor is in agreement with the decision the Contractor shall notify the Owner's Review Administrator in writing within five (5) days, and

appropriate documentation will be signed by the parties to resolve the Claim.

4.9.3 If the Contractor is not in agreement with the proposal of the Owner's Review Administrator as to the resolution of the claim, the Contractor may file a written appeal with the UM System Contracting Officer, [in care of the Director of Facilities Planning and Development, University of Missouri, 109 Old Alumni Centers, University of Missouri, Columbia, Missouri 65211] within fifteen (15) days after receipt of the Owner's Review Administrator's proposal. The UM System Contracting Officer will call a meeting of the Contractor, the Owner's Representative, and the Owner's Review Administrator by written notice, within thirty (30) days after receipt of the Contractor's written appeal. The Owner's Review Administrator shall provide the UM System Contracting Officer with a copy of the written decision and summary of the review meeting, the Contractor's corrections or comments regarding the summary of the review meeting, and any written documentation presented by the Contractor and the Owner's Representative at the initial review meeting. The parties may present further documentation and/or present the testimony of any knowledgeable person regarding the claim at the meeting called by the UM System Contracting Officer.

4.9.4 The UM System Contracting Officer will issue a written decision to resolve the claim within fifteen (15) days after the meeting. If the Contractor is in agreement with the UM System Contracting Officer's proposal, the Contractor shall notify the UM System Contracting Officer in writing within five (5) days, and the Contractor and the Owner shall sign appropriate documents. The issuance of the UM System Contracting Officer's written proposal shall conclude the administrative review process even if the Contractor is not in agreement. However, proposals and any opinions expressed in such proposals issued under this section will not be binding on the Contractor nor will the decisions or any opinions expressed be admissible in any legal actions arising from the Claim and will not be deemed to remove any right or remedy of the Contractor as may otherwise exist by virtue of Contract Documents or law. Contractor and Owner agree that the Missouri Circuit Court for the County where the Work is located shall have exclusive jurisdiction to determine all issues between them. Contractor agrees not to file any complaint, petition, lawsuit or legal proceeding against Owner except with such Missouri Circuit Court.

ARTICLE 5 SUBCONTRACTORS

5.1 Award of Subcontracts

5.1.1 Pursuant to Article 9, the Contractor shall furnish the Owner and the Architect, in writing, with the name, and trade for each Subcontractor and the names of all persons or entities proposed as manufacturers of products, materials and equipment identified in the Contract Documents and where applicable, the name of the installing contractor. The

Owner's Representative will reply to the Contractor in writing if the Owner has reasonable objection to any such proposed person or entity. The Contractor shall not contract with a proposed person or entity to whom the Owner has made reasonable and timely objection.

5.1.2 The Contractor may request to change a subcontractor. Any such request shall be made in writing to the Owner's Representative. The Contractor shall not change a Subcontractor, person, or entity previously disclosed if the Owner makes reasonable objection to such change.

5.1.3 The Contractor shall be responsible to the Owner for acts, defaults, and omissions of its Subcontractors of any tier.

5.2 Subcontractual Relations

5.2.1 By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor of any tier, to the extent of the Work to be performed by the Subcontractor of any tier, to be bound to the Contractor by terms of the Contract Documents and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and the Architect. Each subcontract agreement of any tier shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor of any tier so that subcontracting thereof will not prejudice such rights and shall allow to the Subcontractor of any tier, 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 its sub-subcontractors. The Contractor shall make available to each proposed Subcontractor of any tier, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor of any tier shall be bound. Subcontractors of any tier shall similarly make copies of applicable portions of such documents available to their respective proposed Subcontractors of any tier.

5.2.2 All agreements between the Contractor and a Subcontractor or supplier shall contain provisions whereby Subcontractor or supplier waives all rights against the Owner, contractor, Owner's representative, Architect and all other additional insureds for all losses and damages caused by, arising out of, or resulting from any of the perils covered by property or builders risk insurance coverage required of the Contractor in the Contract Documents. If Contractor fails to include said provisions in all subcontracts, Contractor shall indemnify, defend and hold all the above entities harmless in the event of any legal action by Subcontractor or supplier. If insureds on any such policies require separate waiver

forms to be signed by any Subcontractors of any tier or suppliers, Contractor shall obtain the same.

5.3 Contingent Assignment of Subcontract

5.3.1 No assignment by the Contractor of any amount or any part of the Contract or of the funds to be received thereunder will be recognized unless such assignment has had the written approval of the Owner, and the surety has been given due notice of such assignment and has furnished written consent hereto. In addition to the usual recitals in assignment Contracts, the following language must be set forth: "it is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of the contract and to claims and to liens for services rendered or materials supplied for the performance of the Work called for in said contract in favor of all persons, firms or corporations rendering such services or supplying such materials.

ARTICLE 6 SEPARATE CONTRACTS AND COOPERATION

6.1 The Owner reserves the right to let other contracts in connection with the Work.

6.2 It shall be the duty of each Contractor to whom Work may be awarded, as well as all Subcontractors of any tier employed by them, to communicate immediately with each other in order to schedule Work, locate storage facilities, etc., in a manner that will permit all Contractors to work in harmony in order that Work may be completed in the manner and within the time specified in the Contract Documents.

6.3 No Contractor shall delay another Contractor by neglecting to perform his work at the proper time. Each Contractor shall be required to coordinate his work with other Contractors to afford others reasonable opportunity for execution of their work. Any costs caused by defective, non-compliant, or ill-timed work, including actual damages and liquidated damages for delay, if applicable, shall be borne by the Contractor responsible therefor.

6.4 Each Contractor shall be responsible for damage to Owner's or other Contractor's property done by him or persons in his employ, through his or their fault or negligence. If any Contractor shall cause damage to any other Contractor, the Contractor causing such damage shall upon notice of any claim, settle with such Contractor.

6.5 The Contractor shall not claim from the Owner money damages or extra compensation under this Contract when delayed in initiating or completing his performance hereunder, when the delay is caused by labor disputes, acts of God, or the failure of any other Contractor to complete his performance under any Contract with the Owner, where any such cause is beyond the Owner's reasonable control.

6.6 Progress schedule of the Contractor for the Work shall be submitted to other Contractors as necessary to permit coordinating their progress schedules.

6.7 If Contractors or Subcontractors of any tier refuse to cooperate with the instructions and reasonable requests of other contractors performing work for the Owner under separate contract, in the overall coordinating of the Work, the Owner's Representative may take such appropriate action and issue such instructions as in his judgement may be required to avoid unnecessary and unwarranted delay.

ARTICLE 7 CHANGES IN THE WORK

7.1 CHANGE ORDERS

7.1.1 A change order is a written instrument prepared by the Owner and signed by the Owner and Contractor formalizing their agreement on the following:

- .1** a change in the Work
- .2** the amount of an adjustment, if any, in the Contract amount
- .3** an adjustment, if any, in the Contract time

7.1.2 The Owner may at any time, order additions, deletions, or revisions in the Work by a Change Order or a Construction Change Directive. Such Change Order or Construction Change Directive shall not invalidate the Contract and requires no notice to the surety. Upon receipt of any such document, or written authorization from the Owner's Representative directing the Contractor to proceed pending receipt of the document, Contractor shall promptly proceed with the Work involved in accordance with the terms set forth therein.

7.1.3 Until such time as the change order is formalized and signed by both the Owner and the Contractor it shall be considered a Change Order Request.

7.1.4 The amount of adjustment in the contract price for authorized Change Orders will be agreed upon before such Change Orders becomes effective and will be determined as follows:

- .1** By a lump sum proposal from the Contractor and the Subcontractors of any tier, including overhead and profit.
- .2** By a time and material basis with or without a specified maximum. The Contractor shall submit to the Owner's Representative itemized time and material sheets depicting labor, materials, equipment utilized in completing the Work on a daily basis for the Owner's Representative approval. If this pricing option is utilized, the Contractor may be required to submit weekly reports summarizing costs to

date on time and material change orders not yet finalized.

- .3** By unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or subsequently agreed upon. Such unit prices contained in the Contractor's original proposal are understood to include the Contractor's overhead and profit. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order that application of such unit prices to quantities of the Work proposed will cause substantial inequity to the Owner or to the Contractor, the applicable unit prices shall be equitably adjusted.

7.1.5 The Contractor shall submit all fully documented change order requests with corresponding back-up documentation within the time requested by the Owner but no later than fourteen (14) working days following 1.) the Owner's request for change order pricing in the case of a lump sum; or 2.) the completion of unit price or time and material work.

7.1.6 The Contractor shall submit change order requests in sufficient detail to allow evaluation by the Owner. Such requests shall be fully itemized by units of labor, material and equipment and overhead and profit. Such breakdowns shall be itemized as follows:

- .1** Labor: The Contractor's proposal shall include breakdowns by labor, by trade, indicating number of hours and cost per hour for each Subcontractor as applicable. Such breakdowns shall only include employees in the direct employ of Contractor or Subcontractors in the performance of the Work. Such employees shall only include laborers at the site, mechanics, craftsmen and foremen. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by Owner.
- .2** Material, supplies, consumables and equipment to be incorporated into the Work at actual invoice cost to the Contractor or Subcontractors; breakdowns showing all material, installed equipment and consumables fully itemized with number of units installed and cost per unit extended. Any singular item or items in aggregate greater than one thousand dollars (\$1,000) in cost shall be supported with supplier invoices at the request of the Owner's Representative. Normal hand tools are not compensable.
- .3** Equipment: Breakdown for required equipment shall itemize (at a minimum) delivery / pick-up charge, hourly

rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. Contractor must use the most cost-effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). Contractor shall submit documentation for the Blue Book to support the rate being requested.

7.2 Construction Change Directive

7.2.1 A construction change directive is a written order prepared and signed by the Owner, issued with supporting documents prepared by the Architect (if applicable), directing a change in the Work prior to agreement on adjustment of the Contract amount or Contract time, or both. A Construction Change Directive shall be used in the absence of complete agreement between the Owner and Contractor on the terms of a change order. If the Construction Change Directive allows an adjustment of the contract amount or time, such adjustment amount shall be based on one of the following methods:

- .1** A lump sum agreement, properly itemized and supported by substantiating documents of sufficient detail to allow evaluation.
- .2** By unit prices contained in the Contractor's original proposal and incorporated in the Construction Contract or subsequently agreed upon.
- .3** A method agreed to by both the Owner and the contractor with a mutually agreeable fee for overhead and profit.
- .4** In the absence of an agreement between the Owner and the Contractor on the method of establishing an adjustment of the contract amount, the Owner, with the assistance of the architect, shall determine the adjustment amount on the basis of expenditures by the Contractor for labor, materials, equipment, and other costs consistent with other provisions of the Contract. The contractor shall keep and submit to the Owner an itemized accounting of all cost components, either expended or saved, while performing the Work covered under the Construction Change Directive.

7.2.2 Upon receipt of a Construction Change Directive, Contractor shall promptly proceed with the change in the Work involved and advise Owner of Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum, Contract Time, or both.

7.2.3 A Construction Change Directive signed by Contractor indicates the agreement of the Contractor 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 Overhead and Profit

7.3.1 Overhead and Profit on Change Orders shall be applied as follows:

- .1** The overhead and profit charged by the Contractor and Subcontractors shall be considered to include, but not limited to, job site office and clerical expense, normal hand tools, incidental job supervision, field supervision, payroll costs and other compensation for project manager, officers, executives, principals, general managers, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, time-keepers, and other personnel employed whether at the site or in principal or a branch office for general superintendent and administration of the Work.
- .2** The percentages for overhead and profit charged on Change Orders shall be negotiated and may vary according to the nature, extent, and complexity of the Work involved but in no case shall exceed the following:
 - 15% To the Contractor or the Subcontractor of any tier for Work performed with their respective forces or materials purchased
 - 5% To the Contractor on Work performed by other than his forces
 - 5% To first tier Subcontractor on Work performed by his Subcontractor
- .3** The Contractor will be allowed to add 2% for the cost of bonding and insurance to their cost of work. This 2% shall be allowed on the total cost of the added work, including overhead and profit.
- .4** Not more than three mark-ups, not to exceed individual maximums shown above, shall be allowed regardless of the number of tier subcontractors. Overhead and profit shall be shown separately for each subcontractor of any tier and the Contractor.
- .5** On proposals covering both increases and decreases in the amount of the Contract, the application of overhead and profit shall be on the net change in direct cost for the Contractor or Subcontractor of any tier performing the Work.
- .6** The percentages for overhead and profit credit to the Owner on Change Orders that are strictly decreases in the quantity of work or materials shall be negotiated and may vary according to the nature, extent, and complexity of the Work involved, but shall not be less than the following:

Overhead and Profit

 - 7.5% Credit to the Owner from the Contractor or Subcontractor of any tier for Work performed with their respective forces or materials purchased
 - 2.5% Credit to the Owner from the Contractor on Work performed by other than his forces
 - 2.5% Credit to the Owner from the first tier Subcontractor on Work performed by his Subcontractor of any tier

7.4 Extended General Conditions

7.4.1 The Contractor acknowledges that the percentage mark-up allowed on change orders for overhead and profit cover the Contractor's cost of administering and executing the Work, inclusive of change orders that increase the contract time. Contractor further acknowledges that no compensation beyond the specified mark-up percentages for extended overhead shall be due or payable as a result of an increase in the Contract Time.

7.4.2 The Owner may reimburse the Contractor for extended overhead if an extension of the Contract Time is granted by the Owner, in accordance with Article 4.7.1 and the Owner determines that the extension of the Contract Time creates an inequitable condition for the Contractor. If these conditions are determined by the Owner to exist, the Contractor may be reimbursed by unit prices contained in the Contractor's original bid and incorporated in the Construction Contract or by unit prices subsequently agreed upon.

7.4.3 If unit prices are subsequently agreed upon, the Contractor's compensation shall be limited as follows:

- .1** For the portion of the direct payroll cost of the Contractor's project manager expended in completing the Work and the direct payroll cost of other onsite administrative staff not included in Article 7.3.1. Direct payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor;
- .2** Cost of Contractor's temporary office, including temporary office utilities expense;
- .3** Cost of temporary utilities required in the performance of the work;
- .4** Profit not to exceed 5% of the total extended overhead direct costs;

7.4.4 All costs not falling into one of these categories and costs of the Contractors staff not employed onsite are not allowed.

7.5 Emergency Work

7.5.1 If, during the course of the Work, the Owner has need to engage the Contractor in emergency work, whether related to the Work or not, the Contractor shall immediately proceed with the emergency work as directed by the Owner under the applicable provisions of the contract. In so doing, Contractor agrees that all provisions of the contract remain in full force and effect and the schedule for the Work is not impacted in any way unless explicitly agreed to in writing by the Owner.

ARTICLE 8 TIME

8.1 Progress and Completion

8.1.1 Contractor acknowledges and agrees that time is of the essence of this Contract

8.1.2 Contract Time is the period of time set forth in the Contract for Construction required for Substantial Completion and Final Completion of the entire Work or portions of the Work as defined in the Contract Documents. Time limits stated in the Contract Documents are of the essence of the Contract. The Contract Time may only be changed by a Change Order. By executing the Contract, the Contractor confirms that the Contract Time is a sufficient period for performing the Work in its entirety.

8.1.3 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance and bonds required by Article 11 to be furnished by the Contractor.

8.1.4 The Contractor shall proceed expeditiously and diligently with adequate forces and shall achieve Substantial Completion and Final Completion within the time specified in the Contract Documents.

8.2 Delay in Completion

8.2.1 The Contractor shall be liable for all of the Owner's damages for delay in achieving Substantial Completion and/or Final Completion of the entire Work or portions of Work as set forth in the Contract Documents within the Contract Time unless liquidated damages are specifically provided for in the Contract Documents. If liquidated damages are specifically provided for in the Contract for Construction, Contractor shall be liable for such liquidated damages as set forth in Paragraph 8.3

8.2.2 All time limits stated in the Contract are of the essence of the Contract. However, if the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner or by the Owner's Representative, by changes ordered in the Work, Force Majeure including but not limited to war, armed conflict, riot, civil commotion or disorder, act of terrorism or sabotage; epidemic, pandemic, outbreaks of infectious disease or any other public health crisis, including quarantine or other employee restrictions, compliance with any law or governmental order, rule, regulation or direction, curfew restriction, act of God or natural disaster such as earthquake, volcanic activity, landslide, tidal wave, tsunami, flood, damage or destruction by lightning, drought; explosion, fire, destruction of machines, equipment, prolonged break-down of transport, telecommunication or electric current; general labor disturbance such as but not limited to boycott, strike and lock-out, occupation of factories and premises, or any other causes beyond the Contractor's reasonable control which the Owner's Representative determines may justify

delay then, upon submission of the Time Impact Schedule Analysis (TIA) justifying the delay called out in Section 4.7 of these General Conditions, the Contract Time may be extended for a reasonable time to the extent such delay will prevent Contractor from achieving Substantial Completion and/or Final Completion within the Contract Time and if performance of the Work is not, was not or would not have been delayed by any other cause for which the Contractor is not entitled to an extension of the Contract Time under the Contract Documents. It shall be a condition precedent to any adjustment of the Contract Time that Contractor provide the Owner's Representative with written notice of the cause of delay within seven (7) days from the occurrence of the event or condition which caused the claimed delay. If a Force Majeure is approved by the Owner as the basis for a delay claim, an adjustment in the contract time to the extent the Force Majeure impacts the schedule is the only remedy. No increase in the contract sum for any reason shall be allowed due to a Force Majeure.

8.2.3 The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (1) is not caused, or could not have been anticipated, by the Contractor, (2) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay, (3) prevents Contractor from completing its Work by the Contract Time, and (4) is of a duration not less than one (1) day. Delays attributable to and within the control of a Subcontractor or supplier shall not justify an extension of the Contract Time.

8.2.4 Notwithstanding anything to the contrary in the Contract Documents, except as otherwise noted in these General Conditions, an extension in the Contract Time, to the extent permitted under this Article, shall be the sole remedy of the Contractor for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other claims due to or caused by any events beyond the control of both the Owner and Contractor defined herein as Force Majeure. In no event shall the Contractor be entitled to any compensation or recovery of any damages or any portion of damages resulting from delays caused by or within the control of Contractor or by acts or omissions of Contractor or its Subcontractors of any tier or delays beyond the control of both Owner and Contractor. If the Contractor contends that delay, hindrance, obstruction or other adverse condition results from acts or omissions of the Owner, the Owner's Representative or the Architect, Contractor shall provide written notice to the Owner within seven (7) calendar days of the event giving rise to such claim. Contractor shall only be entitled to an adjustment in the Contract Sum to the extent that such acts or omissions continue after the Contractor's written notice to the Owner of such acts or omissions, but in no case shall Force Majeure be the basis of an increase in the Contract sum. The Owner's exercise of any of its rights or remedies under the Contract

Documents (including, without limitation, ordering changes in the Work, or directing suspension, rescheduling or correction of the Work) regardless of the extent or frequency of the Owner's exercise of such rights or remedies, shall not be the basis of any Claim for an increase in the Contract Sum or Contract Time. In the event Contractor is entitled to an adjustment in the Contract Sum for any delay, hindrance, obstruction or other adverse condition caused by the acts or omissions of the Owner, the Owner's Representative or the Architect, Contractor shall only be entitled to its actual direct costs caused thereby and Contractor shall not be entitled to and waives any right to special, indirect, or consequential damages including loss of profits, loss of savings or revenues, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar type of damages.

8.2.5 If the Contractor submits a progress report or any construction schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied. Further, the Contractor acknowledges and agrees that even if Contractor intends or is able to complete the Work prior to the Contract Time, it shall assert no Claim and the Owner shall not be liable to Contractor for any failure of the Contractor, regardless of the cause of the failure, to complete the Work prior to the Contract Time.

8.3 Liquidated Damages

8.3.1 If Liquidated Damages are prescribed on the Bid Form and Special Conditions in the Contract Documents, the Owner may deduct from the Contract Sum and retain as Liquidated Damages, and not as penalty or forfeiture, the sum stipulated in the Contract Documents for each calendar day after the date specified for completion of the Work that the entire Work is not substantially complete and/or finally complete.

8.3.2 The Owner's Representative shall establish the date of Substantial completion and the date of Final Completion of the Work which shall be conclusive and binding on the Owner and Contractor for the purpose of determining whether or not Liquidated Damages shall be assessed under terms hereof and the sum total amount due.

8.3.3 Liquidated Damages or any matter related thereto shall not relieve the Contractor or his surety of any responsibility or obligation under this Contract.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 Commencement, Prosecution, and Completion

9.1.1 The Contractor shall commence Work within five (5) days upon the date of a "Notice to Proceed" from the Owner or the date fixed in the Notice to Proceed. Contractor shall prosecute the Work with faithfulness and diligence, and the

Contractor shall complete the Work within the Contract Time set forth in the Contract Documents.

9.1.2 The Owner will prepare and forward three (3) copies of the Contract and Performance Bond to the bidder to whom the contract for the Work is awarded and such bidder shall return two (2) properly executed prescribed copies of the Contract and Bond to the Owner.

9.1.3 The construction period, when specified in consecutive calendar days, shall begin when the Contractor receives notice requesting the instruments listed in below. Before the Owner will issue Notice to Proceed to permit the Contractor to begin Work, the Owner shall have received the following instruments, properly executed as described in the Contract Documents. The documents below shall have been received by the Owner within fifteen (15) days after receipt of request for documents:

- .1 Contract
- .2 Bond (See Article 11)
- .3 Insurance (See Article 11)
- .4 List of Subcontractors of any tier
- .5 Affirmative Action Plan (see Article 13.4)

9.1.4 In the event Contractor fails to provide Owner such documents, Contractor may not enter upon the site of the Work until such documents are provided. The date the Contractor is required to commence and complete the Work shall not be affected by the Owner denying Contractor access to the site as a result of Contractor's failure to provide such documents and Contractor shall not be entitled to an adjustment of the Contract Time or Contract sum as a result of its failure to comply with the provisions of this Paragraph

9.1.5 Contracts executed by partnerships shall be signed by all general partners of the partnership. Contracts signed by corporations shall be signed by the President or Vice President and the Secretary or Assistant Secretary. In case the Assistant Secretary or Vice President signs, it shall be so indicated by writing the word "Asst." or "Vice" in front of the words "Secretary" and "President". The corporate seal of the corporation shall be affixed. For all other types of entities, the Contractor and the person signing the Contract on behalf of Contractor represent and warrant that the person signing the Contract has the legal authority to bind Contractor to the Contract.

9.1.6 Any successful bidder which is a corporation organized in a state other than Missouri or any bidder doing business in the State of Missouri under a fictitious name shall furnish, at no cost to the Owner, no later than the time at which the executed Contract for Construction, the Payment Bond, and the Performance Bond are returned, a properly certified copy of its current Certificate of Authority and License to do business in the State of Missouri. No contract will be executed by the

Owner until such certificate is furnished by the bidder, unless there already is on file with the Owner a current certificate, in which event, no additional certificate will be required during the period of time for which such current certificate remains in effect.

9.1.7 Within fifteen (15) calendar days of the issuance of a Notice to Proceed, the Contractor shall submit one (1) signed copy of the following instruments. No payment will be processed until all of these instruments are received and approved by the Owner's Representative.

- .1 Reproducible progress and payment schedule
- .2 Contractor's Schedule of Values
- .3 List of material suppliers
- .4 Itemized breakdown of all labor rates for each classification. Overhead and profit shall not be included. Payroll cost shall include base rate salaries and wages plus the cost of fringe benefits required by agreement or custom and social security contributions, unemployment, payroll taxes and workers' or workmen's compensation insurance and other customary and legally required taxes paid by the Contractor or Subcontractors. Any item or expense outside of these categories is not allowed. The expense of performing Work after regular working hours, on Saturdays, Sundays or legal holidays shall not be included in the above, unless approved in writing and in advance by Owner.
- .5 Itemized breakdown of anticipated equipment rates (breakout operator rate). Overhead and profit shall not be included. Breakdown for required equipment shall itemize (at a minimum) delivery/ pick-up charge, hourly rate and hours used. Operator hours and rate shall not be included in the equipment breakdown. Contractor must use the most cost-effective equipment available in the area and should not exceed the rates listed in the Rental Rate Blue Book for Construction Equipment (Blue Book). Contractor shall submit documentation for the Blue Book to support the rate being requested.

9.1.8 The Contractor shall be paid electronically using the Owner's web-based payment program with a direct electronic transfer from the Owner's account into the Contractor's account. The Contractor must submit the following information to the Owner's Representative:

- .1 Bank Transit Number for the Contractor's bank into which the electronic deposit will be made.
- .2 Bank Account Number for the Contractor's account into which the electronic deposit will be made.
- .3 Contractor's E-Mail address so that formal notification of the deposit by the Owner can be provided.

9.2 Contract Sum

9.2.1 The Owner shall compensate Contractor for all Work described herein, and in the Contract Documents the Contract

Sum set forth in the Contract for Construction, subject to additions and deletions as provided hereunder.

9.3 Schedule of Values

9.3.1 Within fifteen (15) days after receipt of the Notice to Proceed, the Contractor shall submit to the Owner's Representative a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Owner's Representative may require. This schedule, unless objected to by the Owner's Representative, shall be used as a basis for reviewing the Contractor's Applications for Payment. The values set forth in such schedule may, at the Owner's option be used in any manner as fixing a basis for additions to or deletions from the Contract Sum.

9.3.2 The progress and payment schedule of values shall show the following:

- .1 Enough detail as necessary to adequately evaluate the actual percent complete of any line item on a monthly basis, as determined by the Owner's Representative.
- .2 Line items, when being performed by a subcontractor or material supplier, shall correlate directly back to the subcontract or purchase order amount if requested by the Owner's Representative.

9.4 Applications for Payment

9.4.1 The Contractor shall submit monthly to the Owner's Representative and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be supported by such data substantiating the Contractor's right to payment as the Owner's Representative or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage as provided for herein.

9.4.2 Such applications shall not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier

9.4.3 Progress payments shall be made on account of materials and equipment delivered to the site and incorporated in the Work. No payments will be made for materials and equipment stored at the Project site but not yet incorporated into the Work except as provided in Paragraph 9.4.4.

9.4.4 If approved in writing and in advance by Owner, progress payments may be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. Owner may in its sole discretion refuse to grant approval for payments for materials and equipment stored at the Project site but not yet incorporated in the Work. Any approval by Owner for payment for materials and equipment delivered and suitably stored at the site, or stored offsite as noted below,

for subsequent incorporation in the Work shall be conditioned upon Contractor's demonstrating that such materials and equipment are adequately protected from weather, damage, vandalism and theft and that such materials and equipment have been inventoried and stored in accordance with procedures established by or approved by the Owner. Nothing in this clause shall imply or create any liability on the part of the Owner for the Contractor's inventory and storage procedures or for any loss or damage to material, equipment or supplies stored on the site, whether incorporated into the work or not. In the event any such loss or damage occurs, the Contractor remains solely responsible for all costs associated with replacement of the affected materials, supplies and equipment including labor and incidental costs, and shall have no claim against the Owner for such loss.

No allowance shall be made in the project pay requests for materials not delivered to the site of the work and incorporated into the work, except as noted below. For the purposes of this Article, Offsite is defined as any location not owned or leased by the Owner. Contractor shall submit a list of materials that they are requesting payment for offsite storage within 60 days of Notice to Proceed.

- .1 Items considered to be major items of considerable magnitude, if suitably stored, may be allowed in project pay requests on the basis of ninety percent (90%) of invoices
- .2 Determination of acceptable "major items of considerable magnitude" and "suitably stored" shall be made by the Owner's Representative.
- .3 Aggregate quantities of materials not considered unique to this project will not be considered for offsite storage payment.
- .4 Contractor shall submit to the Owner's Representative a list of the material for which application for payment for offsite storage is anticipated no less than forty-five days prior to the submission of the applicable pay request. The list shall include a material description, applicable division, quantity, and discounts offered to the Owner for early payment. Contractor shall also submit the location the material will be stored and the method of protection
- .5 The storage facility shall be subject to approval by the Owner's representative, shall be located within an acceptable distance of the project sites as established by the Owner's Representative and all materials for the Owner's project must be stored separately from all other items within the storage facility and shall be labeled and stored in the name of The Curators of the University of Missouri.
- .6 The Owner's representative shall be provided a minimum of two weeks' notice to visit the storage facility and inspect the stored material prior to submission of the pay request.
- .7 Upon favorable inspection by the Owner's Representative, the Contractor shall, at the Owner's option, submit a Bill of Sale and Bailment Agreement on forms provided by the Owner's

Representative, transferring title of the material or equipment to The Curators of the University of Missouri.

- .8 An invoice provided by the supplier shall be included with the applicable pay request.
- .9 The contractor shall remain fully responsible for all items, until acceptance of the project by the Owner.
- .10 The contractor shall reimburse all costs incurred by the Owner in inspecting and verifying all material stored offsite, including mileage, airfare, meals, lodging and time, charged at a reasonable hourly rate.
- .11 The Contractor shall furnish and maintain insurance covering the replacement cost of the material stored offsite against all losses and shall furnish proof of coverage with the application for payment for material stored offsite.
- .12 The Contractor is responsible for all costs related to storage and handling of material stored offsite unless otherwise directed by the Owner's Representative.

9.4.5 The Application for Payment shall constitute a representation by the Contractor to the Owner that the Work has progressed to the point indicated; the quality of the Work covered by the Application for Payment is in accordance with the Contract Documents; and the Contractor is entitled to payment in the amount requested.

9.4.6 The Contractor will be reimbursed for ninety-five percent (95%) of the value of all labor furnished and material installed and computed in the same manner, less all previous payments made. On projects where a bond is not required, the contractor will be reimbursed for ninety percent (90%) of the value of all labor furnished and material installed and computed in the same manner, less all previous payments made

9.5 Approval for Payment

9.5.1 The Owner's Representative will, within fifteen (15) days after receipt of the Contractor's Application for Payment, either approve Contractor's Application for Payment for such amount as the Owner's Representative determines is properly due or notify the Contractor of the Owner's Representative's reasons for withholding certification in whole or in part as provided in Section 9.6.

9.6 Decisions to Withhold Approval

9.6.1 The Owner's Representative may decide not to certify payment and may withhold approval in whole or in part, to the extent reasonably necessary to protect the Owner. If the Owner's Representative is unable to approve payment in the amount of the Application, the Owner's Representative will notify the Contractor as provided in Paragraph 9.5.1. If the Contractor and Owner's Representative cannot agree on a revised amount, the

Owner's Representative will promptly issue approval for payment for the amount for which the Owner's Representative is able to determine is due Contractor. The Owner's Representative may also decide not to approve payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of approval for payment previously issued, to such extent as may be necessary in the Owner's Representative opinion to protect the Owner from loss because of:

- .1 defective or non-compliant Work not remedied, or damage to completed Work;
- .2 failure to supply sufficient skilled workers or suitable materials;
- .3 third party claims filed or reasonable evidence indicating probable filing of such claims;
- .4 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment, Owner may, at its sole option issue joint checks to subcontractors who have presented evidence that it has not been paid in accordance with the Contract;
- .5 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .6 damage to the Owner or another contractor;
- .7 reasonable evidence that the Work will not be completed within the Contract Time or an unsatisfactory rate of progress made by Contractor;
- .8 Contractor's failure to comply with applicable Laws;
- .9 Contractor's or Subcontractor's failure to comply with contract Prevailing Wage requirements; or
- .10 Contractor's failure to carry out the Work in strict accordance with the Contract Documents.

9.6.2 When the above reasons for withholding approval are removed, approval will be made for amounts previously withheld.

9.7 Progress Payments

9.7.1 Based upon Applications for Payment submitted to the Owner by the Contractor and approvals issued by the Owner's Representative, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

9.7.2 The period covered by each Application for Payment shall be one (1) calendar month.

9.7.3 The Owner shall make payment to Contractor for amounts due and approved by Owner's Representative not later than thirty (30) days after the Owner approves a properly detailed Application for Payment which is in compliance with the Contract Documents. The Owner shall not have the obligation to process or pay such Application for Payment until it receives an Application for Payment satisfying such requirements.

9.7.4 Based on the Schedule of Values submitted by Contractor, Applications for Payment submitted by Contractor

shall indicate the actual percentage of completion of each portion of Contractor's Work as of the end of the period covered by the Application for Payment.

9.7.5 The Contractor shall promptly pay each Subcontractor and Supplier, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's or supplier's portion of the Work, the amount to which said Subcontractor or supplier is entitled, reflecting percentages actually retained from payments to the Contractor on account of each Subcontractor's or supplier's portion of the Work, in full compliance with state statute. The Contractor shall, by appropriate agreement with each Subcontractor or supplier, require each Subcontractor or supplier to make payments to Sub-subcontractors in similar manner.

9.7.6 Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor of any tier nor a laborer or employee of Contractor except to the extent required by law. Retainage provided for by the Contract Documents are to be retained and held for the sole protection of Owner, and no other person, firm or corporation shall have any claim or right whatsoever thereto.

9.7.7 An approval for payment by Owner's Representative, 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.

9.8 Failure of Payment

9.8.1 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment by Contractor shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to: (1) deduct an amount equal to that to which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (2) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that to which the Owner is entitled.

9.9 Substantial Completion

9.9.1 Substantial Completion is the stage in the progress of the Work as defined in Paragraph 1.1.14 as certified by the Owner.

9.9.2 When the Contractor considers the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Owner and the Architect. The Owner's

Representative will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Owner's Representative's inspection discloses any item which is not in accordance with the requirements of the Contract Documents, the Contractor shall complete or correct such item upon notification by the Owner's Representative. The Contractor shall then submit a request for another inspection by the Owner's Representative to determine Substantial Completion. When the Work or designated portion thereof is substantially complete, the Owner will issue a Certificate of Substantial Completion. Substantial Completion shall transfer from the Contractor to the Owner responsibilities for security, maintenance, heat, utilities, damage to the Work and insurance. In no event shall Contractor have more than thirty (30) days to complete all items on the Punch List and achieve Final Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion or as agreed otherwise.

9.9.3 At the date of Substantial Completion, the Contractor may apply for, and if approved by Owner's Representative, the Owner, subject to the provisions herein, shall increase total payments to one hundred percent (100%) of the Contract Sum less one hundred fifty percent (150%) of the value of any incomplete Work and unsettled claims, as determined by the Owner's Representative.

9.10 Partial Occupancy or Use

9.10.1 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. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, security, maintenance, heat, utilities, damage to the Work and insurance. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by the Owner's Representative.

9.10.2 Immediately before such partial occupancy or use, the Owner, and Contractor 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. 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.

9.11 Final Completion and Final Payment

9.11.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner's Representative and the Architect will promptly make such inspection and, when the Owner's Representative and Architect find the Work acceptable under the Contract Documents and the Contract fully performed, the Owner's Representative will promptly issue a final approval for payment; otherwise, Owner's

Representative will return Contractor's Final Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Submission of a Final Application for Payment shall constitute a further representation that conditions listed in Paragraph 9.11.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Owner's Representative as part of the final Application for Payment. The final approval for payment will not be issued by the Owner's Representative until all warranties and guarantees have been received and accepted by the Owner.

9.11.2 The Owner will request the Contractor to submit the application for final payment along with a manually signed notarized letter on the Contractor's letterhead certifying that:

- .1** Labor costs, prevailing wage rates, fringe benefits and material costs have been paid.
- .2** Subcontractors of any tier and manufacturers furnishing materials and labor for the project have fully completed their Work and have been paid in full.
- .3** The project has been fully completed in accordance with the Contract Documents as modified by Change Orders.
- .4** The acceptance by Contractor of its Final Payment, by check or electronic transfer, shall be and operate as a release of all claims of Contractor against Owner for all things done or furnished or relating to the Work and for every act or alleged neglect of Owner arising out of the Work.

9.11.3 Final Payment constituting the entire unpaid balance due shall be paid by the Owner to the Contractor within thirty (30) days after Owner's receipt of Contractor's Final Application for Payment which satisfies all the requirements of the Contract Documents and Owner's receipt of all information and documents set forth in Section 9.11.

9.11.4 No payment under this Contract, including but not limited to final payment, shall constitute acceptance by Owner of any Work or act not in accordance with the requirements of the Contract Documents.

9.11.5 No recourse shall be had against any member of the Board of Curators, or officer thereof, for any payment under the Contract or any claim based thereon.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 Safety Precautions and Programs

10.1.1 The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.

10.1.2 All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.

10.1.3 In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. "Rendered Harmless" shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

10.2 Safety Of Persons and Property

10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:

- .1** students, faculty, staff, the public, construction personnel, 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 or the Contractor's Subcontractors of any tier; 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 give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.

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 the highest degree of care and carry on such activities under supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Article 10 caused in whole or in part by the Contractor, a Subcontractor of any tier, 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 Article 10, except damage or loss attributable solely to acts or omissions of Owner or the 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 other obligations stated elsewhere in the Contract.

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, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its subcontractors of any tier.

10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.2.8 The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with

the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.

10.2.9 The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.

ARTICLE 11 INSURANCE & BONDS

11.1 Insurance

11.1.1 Contractor shall secure from the date of the Contract for Construction and maintain for such periods of time as set forth below, insurance of such types and in such amounts specified below, to protect Contractor, Owner and others against all hazards or risks of loss described below. The form of such insurance together with carriers thereof, in each case, shall be approved by Owner, but, regardless of such approval, it shall be the responsibility of Contractor to maintain the insurance coverages set forth herein.

11.1.2 The contractor shall not be allowed on the Owners property without proof of the insurance coverages set forth herein

11.2 Commercial General Liability

11.2.1 Contractor shall secure and maintain from the date of the Contract and for a period of at least five (5) years from the date of Final Completion of the entire Work Commercial General Liability insurance ("CGL") with a combined single limit of not less than \$2,000,000 per occurrence, \$5,000,000 general aggregate, \$5,000,000 products and completed operations aggregate and \$1,000,000 personal injury and advertising injury. General Aggregate should apply per project. An umbrella policy may be used to satisfy these limits. If the General Aggregate is not on a per project basis, the contractor shall provide an additional \$2,000,000 general aggregate.

11.2.2 CGL insurance shall be written on a comprehensive form and shall cover claims and liability in connection with or resulting from the Contractor's operations and activities under the Contract, for personal injuries, occupational sickness, disease, death or damage to property of others, including loss of use resulting therefrom, arising out of any operations or activities of the Contractor, its agents, or any Subcontractors of any tier or by anyone directly or indirectly employed by either of them.

11.2.3 CGL insurance shall include premises, operations, independent contractors, products-completed operations, personal injury and advertising injury and liability assumed under an insured contract (including the tort liability of another assumed in a business contract) coverages. In particular, and not by way of any limitation, the CGL

insurance shall cover the Contractor's indemnity obligations contained in the Contract Documents.

11.2.4 There shall be no endorsement or modification of the CGL policy limiting the scope of coverage for liability arising from blasting, explosion, collapse, or underground property damage.

11.2.5 "The officers, employees, and agents of The Curators of the University of Missouri" shall be endorsed as an "additional insured" under the CGL policy. The additional insured status must be conveyed by using the ISO CG 2 10 (2004) edition or equivalent and the ISO CG 20 37 (2004) edition. The policy shall be endorsed to be primary coverage and any other insurance carried by the Owner shall be excess only and will not contribute with Contractors' insurance. To confirm, the Endorsement should accompany the insurance certificate.

11.2.6 Contractor waives all rights against Owner and its agents, officers, representatives, and employees for recovery of damages to the extent those damages are covered by the CGL policy required hereunder.

11.3 Licensed for Use Vehicle Liability

11.3.1 Contractor shall secure and maintain from the date of the Contract for Construction until the date of Final Completion of the entire Work, insurance, to be on comprehensive form, which shall protect Contractor against any and all claims for all injuries and all damage to property arising from the use of automobiles, trucks and motorized vehicles, in connection with the performance of Work under this Contract, and shall cover the operation on or off the site of the Work of all motor vehicles licensed for highway use whether they are owned, non-owned or hired. Such insurance shall include contractual liability coverage and shall provide coverage on the basis of the date of any accident. The liability limits under such policy shall not be less than \$2,000,000 combined single limit for bodily injury and property damage per accident.

11.3.2 Contractor waives all rights against Owner and its agents, officers, directors, and employees for recovery of damages to the extent such damages are covered by the automobile liability insurance required hereunder.

11.4 Workers' Compensation Insurance

11.4.1 Contractor shall purchase and maintain workers' compensation insurance and employers' liability insurance which shall protect Contractor from claims for injury, sickness, disease or death of Contractor's employees or statutory employees. The insurance policies required hereunder shall include an "all states" or "other states" endorsement. In case any Work is sublet, Contractor shall require any Subcontractor of any tier to provide the insurance coverages required under this Section 11.4.

11.4.2 Contractor's workers' compensation insurance coverage shall be in compliance with all applicable Laws, including the statutes of the State of Missouri. Contractor's employers' liability coverage limits shall not be less than \$1,000,000 each accident for bodily injury by accident or \$1,000,000 each employee for bodily injury by disease.

11.5 Liability Insurance General/Other Requirements

11.5.1 Any Consultant/Contractor providing professional design services as part of the contract shall be required to provide and maintain, from the date of this Contract and for a period of ten (10) years after the date of Final Completion, Professional Liability insurance to cover any claims, including but not limited to errors, omissions, and negligence, which may arise from the Design and related Services performed by the Consultant. The minimum limits for such Policy shall be \$1,000,000.00 per occurrence/\$1,000,000.00 aggregate. The insurance afforded by the policy shall meet the requirements of this Section 11.2 and Section 11.5 relating to CGL Policies, and without limiting the foregoing, shall be extended to cover the liability of "The officers, employees, and agents of The Curators of the University of Missouri", who shall be named as additional insureds therein, and this liability is assumed in writing by the Contractor's Consultant under the written Subcontract described herein. All insurance coverages procured by Contractor shall be provided by agencies and insurance companies acceptable to and approved by Owner. Any insurance coverage shall be provided by insurance companies that are duly licensed to conduct business in the State of Missouri as an admitted carrier. The form and content of all insurance coverage provided by Contractor are subject to the approval of Owner. All required insurance coverages shall be obtained and paid for by Contractor. Any approval of the form, content or insurance company by Owner shall not relieve the Contractor from the obligation to provide the coverages required herein.

11.5.2 All insurance coverage procured by the Contractor shall be provided by insurance companies having policyholder ratings no lower than "A-" and financial ratings not lower than "XI" in the Best's Insurance Guide, latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents. Insurance coverages required hereunder shall not be subject to a deductible amount on a per-claim basis of more than \$10,000.00 and shall not be subject to a per-occurrence deductible of more than \$25,000.00. Insurance procured by Contractor covering the additional insureds shall be primary insurance and any insurance maintained by Owner shall be excess insurance.

11.5.3 All insurance required hereunder shall provide that the insurer's cost of providing the insureds a defense and appeal, including attorneys' fees, shall be supplementary and shall not be included as part of the policy limits but shall remain the insurer's separate responsibility. Contractor shall cause its insurance carriers to waive all rights of subrogation,

except for Workers' Compensation, against the Owner and its officers, employees and agents.

11.5.4 The Contractor shall furnish the Owner with certificates, Additional Insured endorsements, policies, or binders which indicate the Contractor and/or the Owner and other Contractors (where required) are covered by the required insurance showing type, amount, class of operations covered, effective dates and dates of expiration of policies prior to commencement of the work. Contractor is required to maintain coverages as stated and required to notify the University of a Carrier Change or cancellation within 2 business days. The University reserves the right to request a copy of the policy. Contractor fails to provide, procure, and deliver acceptable policies of insurance or satisfactory certificates or other evidence thereof, the Owner may obtain such insurance at the cost and expense of the Contractor without notice to the Contractor.

11.5.5 With respect to all insurance coverages required to remain in force and affect after final payment, Contractor shall provide Owner additional certificates, policies and binders evidencing continuation of such insurance coverages along with Contractor's application for final payment and shall provide certificates, policies and binders thereafter as requested by Owner.

11.5.6 The maintenance in full current force and effect of such forms and amounts of insurance and bonds required by the Contract Documents shall be a condition precedent to Contractor's exercise or enforcement of any rights under the Contract Documents.

11.5.7 Failure of Owner to demand certificates, policies and binders evidencing insurance coverages required by the Contract Documents, approval by Owner of such certificates, policies and binders or failure of Owner to identify a deficiency from evidence that is provided by Contractor shall not be construed as a waiver of Contractor's obligations to maintain the insurance required by the Contract Documents.

11.5.8 The Owner shall have the right to terminate the Contract if Contractor fails to maintain the insurance required by the Contract Documents.

11.5.9 If Contractor fails to maintain the insurance required by the Contract Document, Owner shall have the right, but not the obligation, to purchase said insurance at Contractor's expense. If Owner is damaged by Contractor's failure to maintain the insurance required by the Contract Documents, Contractor shall bear all reasonable costs properly attributable to such failure.

11.5.10 By requiring the insurance set forth herein and in the Contract Documents, Owner does not represent or warrant that coverage and limits will necessarily be adequate to protect Contractor, and such coverages and

limits shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

11.5.11 If Contractor's liability policies do not contain a standard separation of insureds provision, such policies shall be endorsed to provide cross-liability coverage.

11.5.12 If a part of the Work hereunder is to be subcontracted, the Contractor shall: (1) cover any and all Subcontractors in its insurance policies; (2) require each Subcontractor to secure insurance which will protect said Subcontractor and supplier against all applicable hazards or risks of loss designated in accordance with Article 11 hereunder; and (3) require each Subcontractor or supplier to assist in every manner possible in the reporting and investigation of any accident, and upon request, to cooperate with any insurance carrier in the handling of any claim by securing and giving evidence and obtaining the attendance of witnesses as required by any claim or suit.

11.5.13 It is understood and agreed that the insurance coverages required by the provisions of this Article 11 are required in the public interest and that the Owner does not assume any liability for acts of Contractor or Subcontractors of any tier or their employees in the performance of the Contract or Work.

11.6 Builder's Risk Insurance

11.6.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the State of Missouri, as an admitted carrier, builder's risk insurance on the entire Work. Such insurance shall be written on a completed value form for the entire Work. The insurance shall apply on a replacement cost basis.

11.6.2 The insurance as required herein shall name as insureds the Owner, Contractor, and all Subcontractors of any tier. The insurance policy shall contain a provision that the insurance will not be canceled, allowed to expire or materially changed until at least thirty (30) days prior written notice has been given to Owner.

11.6.3 The insurance as required herein shall cover the entire Work, including reasonable compensation for Architect's services and expenses made necessary by an insured loss. Insured property shall include portions of the Work located away from the site (including all offsite stored materials) but intended for use at the site and shall also cover portions of the Work in transit, including ocean transit. The policy shall include as insured property scaffolding, falsework, and temporary buildings located at the site. The policy shall cover the cost of removing debris, including demolition as may be made legally necessary by the operation of any law, ordinance, or regulation.

11.6.4 The insurance required herein shall be on an all risk form and shall be written to cover all risks of physical loss or damage to the insured party and shall insure at least against the perils of fire and extended coverage, theft, vandalism,

malicious mischief, collapse, lightening, earthquake, flood, frost, water damage, windstorm and freezing.

11.6.5 If there are any deductibles applicable to the insurance required herein, Contractor shall pay any part of any loss not covered because of the operation of such deductibles.

11.6.6 The insurance as required herein shall be maintained in effect until the earliest of the following dates:

- .1 the date which all persons and organization who are insureds under the policy agree in writing that it shall be terminated;
- .2 the date on which final payment of this Contract has been made by Owner to Contractor; or
- .3 the date on which the insurable interests in the property of all insureds other than the Owner have ceased.

11.6.7 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors of any tier, suppliers, agents and employees, each of the other, (2) the Architect and Architect's consultants, and (3) separate contractors described in Article 6, if any, and any of their subcontractors of any tier, suppliers, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Section 11.7 or other insurance applicable to the Work, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors of any tier, suppliers, agents, and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, was at fault or was negligent in causing the loss and whether or not the person or entity had an interest in the property damaged.

11.6.8 A loss insured under Contractor's property insurance shall be adjusted by the Owner in good faith and made payable to the Owner for the insureds, subject to requirements of the Contract Documents. The Contractor shall pay Subcontractors of any tier their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors of any tier to make payments to their Sub-subcontractors in similar manner.

11.7 Bonds

11.7.1 When the Contract sum exceeds Fifty Thousand Dollars (\$50,000), the Contractor shall procure and

furnish a Performance Bond and a Payment Bond in the form prepared by the Owner, each in an amount equal to one hundred percent (100%) of the Contract Sum, as well as adjustments to the Contract Sum. The Performance Bond shall secure and guarantee Contractor's faithful performance of this Contract, including but not limited to Contractor's obligation to correct defects after final payment has been made as required by the Contract Documents. The Payment Bond shall secure and guarantee payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with this Contract. These Bonds shall be in effect through the duration of the Contract plus the Guaranty Period as required by the Contract Documents.

11.7.2 The bonds required hereunder shall be executed by a responsible surety licensed in the State of Missouri, with a Best's rating of no less than A-/XI. The Contractor shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of this power of attorney indicating the monetary limit of such power.

11.7.3 If the surety of any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to conduct business in the State of Missouri is terminated, or it ceases to meet the requirements of this paragraph, Contractor shall within ten (10) days substitute another bond and surety, both of which must be acceptable to Owner. If Contractor fails to make such substitution, Owner may procure such required bonds on behalf of Contractor at Contractor's expense.

11.7.4 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 to such person or entity.

11.7.5 The Contractor shall keep the surety informed of the progress of the Work, and, where necessary, obtain the surety's consent to or waiver of: (1) notice of changes in the Work; (2) request for reduction or release of retention; (3) request for final payment; and (4) any other material required by the surety. The Owner shall be notified by the Contractor, in writing, of all communications with the surety, as it relates to items one through four. The Owner may, in the Owner's sole discretion, inform surety of the progress of the Work, any defects in the Work, or any defaults of Contractor under the Contract Documents and obtain consents as necessary to protect the Owner's rights, interest, privileges and benefits under and pursuant to any bond issued in connection with the Work.

11.7.6 Contractor shall indemnify and hold harmless the Owner and any agents, employees, representative or member of the Board of Curators from and against any claims, expenses, losses, costs, including reasonable attorneys' fees, as a result of any failure of Contractor to procure the bonds required herein.

ARTICLE 12
UNCOVERING AND CORRECTION OF THE
WORK

12.1 Uncovering of the 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 shall, if required in writing by the Architect or the Owner's Representative, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.

12.1.2 If a portion of the Work has been covered which the Architect or the Owner's Representative has not specifically requested to observe, prior to its being covered, the Architect or the Owner's Representative may request to see such Work, and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner will be responsible for payment of such costs.

12.2 Correction of the Work

12.2.1 The Architect or Owner's Representative shall have the right to reject Work not in strict compliance with the requirements of the Contract Documents. The Contractor shall promptly correct Work rejected by the Architect or the Owner's Representative for failing to conform to the requirements of the Contract Documents, whether observed before or after final completion and whether or not fabricated, installed, or completed. If Work has been rejected by Architect or Owner's Representative, the Architect or Owner's Representative shall have the right to require the Contractor to remove it from the Project site and replace it with Work that strictly conforms to the requirements of the Contract Documents regardless, if such removal and replacement results in "economic waste." Contractor shall pay all claims, costs, losses and damages caused by or resulting from the correction, removal or replacement of defective, or non-compliant Work, including but not limited to, all costs of repair or replacement of Work of others. The Contractor shall bear costs of correcting, removing and replacing such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby. If prior to the date of final payment, the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

12.2.2 If, within twelve (12) months after the date of Final Completion of the Work or designated portion thereof, or after the date for commencement of warranties, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found not to be in strict accordance with the requirements of the Contract Documents, the Contractor shall correct or remove and replace such defective Work, at the Owner's discretion. Such twelve (12) month period is referred to as the "Guarantee Period." The obligations under this Paragraph 12.2.2 shall cover any repairs, removal, and replacement to any part of the Work or other property caused by the defective Work.

12.2.3 The Contractor shall remove from the site portions of the Work which 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 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct or remove it and replace such nonconforming Work. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Owner, the Owner may take action to correct or remove the nonconforming work at the contractor's expense.

12.2.5 The Contractor shall bear the cost of correcting destroyed or damaged Work or property, whether completed or partially completed, of the Owner or of others caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

12.2.6 Nothing contained in Article 12 shall be construed to establish a period of limitation with respect to other obligations that the Contractor might have under the Contract Documents. Establishment of the twelve (12) month Guarantee Period as described in Article 12 relates only to the specific obligation of the Contractor to correct, remove or replace 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 under the Contract Documents. The requirements of Article 12 are in addition to and not in limitation of any of the other requirements of the Contract for warranties or conformance of the Work to the requirements of the Contract Documents.

12.3 Acceptance of Nonconforming Work

12.3.1 The Owner may accept Work which is not in accordance with the Contract Documents, instead of requiring its removal and correction, in its sole discretion. In such case the Contract Sum will be adjusted as appropriate and equitable. Such adjustment shall be made whether or not final payment has been made. Nothing contained herein shall impose any obligation upon the Owner to accept nonconforming or defective Work.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.1 Written Notice

13.1.1 All notices required to be given by the contractor under the terms of this Contract shall be made in writing. Written notice when served by the Owner will be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an office of the corporation for which it was intended, or if delivered at or sent to the last business address known to the party giving notice.

13.2 Rights and Remedies

13.2.1 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.

13.2.2 No action or failure to act by the Owner, the Architect, or the Owner's Representative will constitute a waiver of a right or duty afforded to the Owner under the Contract Documents, nor will such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

13.2.3 The terms of this Contract and all representations, indemnifications, warranties and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Work and shall remain in effect so long as the Owner is entitled to protection of its rights under applicable law.

13.2.4 Contractor shall carry out the Work and adhere to the current construction schedule during all disputes or disagreements with the Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements except as the Owner and Contractor may otherwise agree to in writing.

13.3 Tests and Inspections

13.3.1 Tests, inspections, and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, codes, or regulations shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory, the Owner's Authorized Agent, or entity acceptable to the Owner, and the Contractor shall bear related costs of tests, inspections, and approvals as required in the Contract Documents. The Contractor shall give the Architect, Owner's Representative, and the Owner's Authorized Agent timely notice of when and where tests and inspections are to be made so the

Architect, the Owner's Representative and/or the Owner's Authorized Agent may observe procedures or perform the necessary tests or inspections.

13.3.2 If the Architect, Owner's Representative, or the Owner's Authorized Agent determine that portions of the Work require additional testing, inspection or approval not included in the Contract Documents, or required by law, the Architect, or the Owner's Representative will instruct the Contractor to make arrangements for such additional testing, inspection, or approval by an entity acceptable to the Owner's Representative and the Contractor shall give timely notice to the Architect, the Owner's Representative or the Owner's Authorized Agent, of when and where tests and inspections are to be made so the Architect, Owner's Representative and/or the Owner's Authorized Agent, ~~so~~ may choose that the tests or inspections can be performed or observed. The Owner will bear such costs except as provided elsewhere in Article 13.

13.3.3 If such procedures for testing, inspection, or approval under Article 13 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's and Owner's Authorized Agent's services and expenses.

13.3.4 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 Owner's Representative and Architect.

13.3.5 Contractor shall take all necessary actions to ensure that all tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.3.6 Contractor shall arrange for and pay for all costs of all testing required by the Contract Documents or any applicable Laws for materials to be tested or certified at or on the place or premises of the source of the material to be supplied. The Owner shall have the right to require testing of all materials at the place of the source of the material to be supplied if not required by the Contract Documents or any applicable Laws. The Owner shall bear the costs of such tests and inspections not required by the Contract Documents or by applicable Laws unless prior defective Work provides Architect or Owner with a reasonable belief that additional defective Work may be found, in which case Contractor shall be responsible for all costs of tests and inspections ordered by the Owner or Architect, whether or not such tests or inspection reveals that Work is in compliance with the Contract Documents.

13.4 Nondiscrimination in Employment Equal Opportunity

13.4.1 The University serves from time to time as a contractor for the United States government. Accordingly, the provider of goods and/or services shall comply with

federal laws, rules and regulations applicable to subcontractors of government contracts including those relating to equal employment opportunity and affirmative action in the employment of minorities (Executive Order 11246), women (Executive Order 11375), persons with disabilities (29 USC 706) and Executive Order 11758, and certain veterans (38 USC 4212 formerly [2012]) contracting with business concerns with small disadvantaged business concerns (Publication L. 95-507). Contract clauses required by the Government in such circumstances are incorporated herein by reference.

13.5 Supplier Diversity Goal Program

13.5.1 The Contractor shall subcontract with diverse firms no less than the amount pledged in the Contractor's Bid and/or the amount accepted by the Owner.

13.5.2 If the Contractor must remove any diverse subcontractor of any tier, the Contractor shall replace the diverse subcontractor of any tier with another diverse subcontractor(s) of equal dollar value to the diverse supplier removed. The Contractor shall immediately notify the Owner's Representative in writing of the Contractor's intent to remove any, and the Contractor's plan to maintain subcontracts with diverse firms of no less than amount pledged in the Contractor's Bid and/or the amount accepted by the Owner. All changes of diverse subcontractor of any tier shall be approved by the Director of Facilities Planning & Development.

13.5.3 If the Contractor fails to meet or maintain the contractor's Supplier Diversity subcontracting pledge, the Contractor shall immediately notify in writing the Owner's Representative, and the Director of Facilities Planning & Development. Such notice shall include a description of the Contractor's good faith effort to comply with their Supplier Diversity subcontracting pledge.

13.5.4 If the Director of Facilities Planning & Development finds the Contractor has failed to comply in good faith with the Owner's Supplier Diversity goal program, the Director may take appropriate action, including but not limited to, declaring the Contractor ineligible to participate in any contracts with the Owner for a period not to exceed six (6) months, and/or directing that the Contractor's actions be declared a material breach of the Contract and that the Contract be terminated.

13.5.5 The Contractor and his subcontractors shall develop, implement, maintain, and submit in writing to the Director of Facilities Planning & Development, an affirmative action program if at least fifty (50) persons in the aggregate are employed under this contract. If less than fifty (50) persons in the aggregate are to be employed under this contract, the Contractor shall submit, in lieu of the written affirmative action program, a properly executed "Affidavit for Affirmative Action" in the form as included in the Contract Documents. For the purpose of this section, an "Affirmative Action Program"

means positive actions to influence all employment practices (including, but not limited to, recruiting, hiring, promoting, and training) in providing equal employment opportunity regardless of race, color, sex, national origin, religion, age (where the person affected is between 40 and 70), disabled and Vietnam-era veteran status, and handicapped otherwise qualified status. Such affirmative action program shall include:

- .1 A written policy statement committing the total organization to affirmative action and assigning management responsibilities and procedures for evaluation and dissemination.
- .2 The identification of a person designated to handle affirmative action.
- .3 The establishment of non-discriminatory selection standards, objective measures to analyze recruitment, an upward mobility system, a wage and salary structure, and standards applicable to lay-off, recall, discharge, demotion, and discipline.
- .4 The exclusion of discrimination from collective bargaining agreements.
- .5 Performance of an internal audit of the reporting system to monitor execution and to provide for future planning.

13.5.6 In the enforcement of this non-discrimination requirement, the Owner may use any reasonable procedures available, including but not limited to: requests, reports, site visits, and inspection of relevant documents of Contractors and Subcontractors of any tier. The contractor shall submit a final Affidavit of Supplier Diversity Participation for each diverse firm at the end of the project stating the actual amount paid to the diverse firm.

13.6 Wage Rates (If the contract amount is less than \$75,000, the requirements of this section will not apply. Any contract adjustments that increase the contract above \$75,000 will be subject to this section.)

13.6.1 The Contractor shall pay workers employed in the execution of this contract in full each week and not less than the predetermined wage rates and overtime for work of a similar character that have been made a part of this Contract. These rates are determined by the University of Missouri Director of Facilities Planning and Development. The rates are based on wage rates published in the Annual Wage Orders of the Missouri Department of Labor and Industrial Relations (MDLIR). The Contractor is to use MDLIR 8 CSR 30-3.020; .030; .040, .060 in determining the appropriate occupational titles and rates for workers used in the execution of this contract. All determinations and/or interpretations regarding wage rates and classification of workers will be made by the office of the University of Missouri Director of Facilities Planning and Development. The Contractor is responsible for the payment of the aggregate of the Basic Hourly Rate and the Total Fringe Benefits to the workers on the project. Fringe benefit payments may be made to the worker in cash, or irrevocably made by a Contractor or Subcontractor to a trustee or to a third person pursuant to a fund, plan or program, or pursuant to an enforceable

commitment, or any combination thereof, to carry out a financially responsible plan or program which was communicated in writing to the workmen affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the Contractor or Subcontractor is not required by other federal or state law to provide any of the benefits as referenced in §290.210(5) RSMo 1994. Pay for travel, mileage, meals, bonuses, or other expenses are not fringe benefits and cannot be considered part of the workers wage rate. The Contractor shall not make any deductions for food, sleeping accommodations, transportation, use of small tools, uniforms, or anything of any kind or description, unless the Contractor and employee enter into an agreement in writing at the beginning of the worker's term of employment, and such agreement is approved by the Owner. In the event the contract contains more than one wage determination the Contractor shall comply with both.

13.6.2 The Contractor shall submit to the Owner with the Contractor's periodic pay request, certified payroll records for labor performed by the Contractor and Subcontractors of any tier. The Contractor shall submit all required certified payroll information records electronically in pdf format using the Owner's web-based payment program. The certified payroll forms shall contain the name, address, personal identification number, and occupational title of the workers as well as the hours they work each day. The Owner's acceptance of certified payroll records does not in any way relieve the Contractor of any responsibility for the payment of prevailing wages to workers on the project. The Contractor shall also maintain copies of the certified payroll records. The Owner may, at any time, request copies of, and/or inspect all of the Contractor's payroll records for the Work to verify compliance. The Contractor shall furnish the Owner copies of payroll records within 10 days of the Owner's written request. The Contractor shall provide copies of workers I-9 forms within 24 hours of written notice. (If applicable, and required by Owner, the Contractor will demonstrate that the Contractor is enrolled and participating in a federal work authorization program with respect to the employees working in connection with this project.) Such payroll records shall be maintained in accordance with Article 13.7.1 and shall be available for inspection for two (2) years after final completion of the Work. The contractor further agrees, in the event the records are not presented as requested, he will abide by any decision made by the Owner regarding underpayment of wages to workers and amounts owed them as well as liquidated damages for underpayment of wages. Falsification of the certified payroll records may

result in the debarment of the contractor or subcontractor from future work with the University.

13.6.3 The acquisition of products or services is subject to the supplier's conformance to the rules and regulations of the President's Committee on Equal Employment Opportunity (41 CFR, Ch. 60).

13.6.4 The Contractor shall comply with the Copeland Regulations of the Secretary of Labor (29 CFR, Part 3), which are incorporated herein by reference. In addition, the Weekly Statement of Compliance required by these Regulations shall also contain a statement that the applicable fringe benefits paid are equal to or greater than those set forth in the minimum wage decision.

13.6.5 Contractor acknowledges that violation of the requirements of Article 13.6 result in additional costs to Owner, including, but not limited to, cost of construction delays, of additional work for Owner's staff and legal expense. The cost of Contractor's violation of the provisions of Article 13.6 would be and is difficult to determine and establish. In the event that Contractor fails to comply with the provisions of this Article 13.6, Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of Fifty Dollars (\$50.00) per day per individual who is paid less than the applicable prevailing wage, to approximate the investigative cost resulting to the Owner for such violations. To approximate the delay costs, Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of One Hundred Dollars (\$100.00) per day for each day the Contract cannot be closed out and final payment made because of Contractor's failure to comply with the provisions of this Article 13.6. Such liquidated damages shall be collected regardless of whether the Work has been completed. The liquidated damages and other amounts set forth in this Article 13.6 shall be in addition to all other liquidated damages the Owner may be entitled as set forth in the Contract Documents.

13.6.6 The Owner may deduct liquidated damages described Article 13 and the amounts set forth in Article 13 from any unpaid amounts then or thereafter due the Contractor under the Contract. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner.

13.6.7 The Contractor shall specifically incorporate the obligations of Article 13 into the subcontracts, supply agreements and purchase orders for the Work and require the same of any Subcontractors of any tier.

13.6.8 Contractor acknowledges and recognizes that a material factor in its selection by the Owner is the Contractor's willingness to undertake and comply with the requirements of this Article 13.6. If Contractor fails to comply with the provisions of this Article 13.6, Owner may, in its sole discretion, immediately terminate the Contract

upon written notice. The rights and remedies of Owner provided herein shall not be exclusive and are in addition to other rights and remedies provided by law or under this Contract.

13.6.9 Only such workers who are individually registered in a bona fide apprenticeship program approved by the U.S. Department of Labor, Office of Apprenticeship can be paid less than the journeyman rate of pay. "Entry Level Workers; must be registered apprentices. The apprenticeship ratio will be one to one with a journeyman of the same classification. Any worker not registered as an apprentice per this section will be paid as a journeyman.

13.6.10 The Contractor shall post the wage rates for the contract in a conspicuous place at the field office on the project. On projects where there is no field office the Contractor may post the wage rates at their local office, as long as they provide a copy of the wage rates to a worker upon request. The wage rates shall be kept in a clearly legible condition for the duration of the project.

13.6.11 Neither the Contractor, nor any Subcontractor of any tier, nor any person hired by them or acting on their behalf, shall request or demand that workers pay back, return, donate, contribute, or give any part, or all, of said workers wages, salary, or any thing of value, upon the statement, representation or understanding that failure to comply with such request or demand will prevent such worker from procuring or retaining employment. The exception being to an agent or representative of a duly constituted labor organization acting in the collection of dues or assessments of such organization.

13.6.12 No contractor or subcontractor may directly or indirectly receive a wage subsidy, bid supplement, or rebate for employment on this project if such wage subsidy, bid supplement, or rebate has the effect of reducing the wage rate paid by the employer on a given occupational title below the prevailing wage rate as provided in contract. In the event a wage subsidy, bid supplement, or rebate is provided or received, the entity receiving such subsidy, supplement, or rebate shall report the date and amount of such subsidy, supplement, or rebate to the University within thirty days of receipt of payment. This disclosure report shall be a matter of public record. Any employer not in compliance with this Article shall owe to the University double the dollar amount per hour that the wage subsidy, bid supplement, or rebate has reduced the wage rate paid by the employer below the prevailing wage rate for each hour that work was performed.

13.6.13 Time and one-half overtime will be paid on all hours over 10 hours per day or 40 hours per week. The wage rate is the total of the "Basic Hourly Rate" plus "Total Fringe Benefits" or the "public works contracting minimum wage". For all work performed on a Sunday or

Holiday, not less than twice the prevailing hourly rate of pay or public works contracting minimum wage will apply. Holidays are as follows: January first, the last Monday in May, July fourth, the first Monday in September, November 11, the fourth Thursday in November, December twenty-fifth. If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

13.7 Records

13.7.1 The Owner, or any parties it deems necessary, shall have access to and the right to examine any accounting or other records of the Contractor involving transactions and Work related to this Contract for five (5) years after final payment or five (5) years after the final resolution of any on going disputes at the time of final payment. All records shall be maintained in accordance with generally accepted accounting procedures, consistently applied. Subcontractors of any tier shall be required by Contractor to maintain records and to permit audits as required of Contractor herein.

13.8 Codes and Standards

13.8.1 The Work shall be performed to comply with the International Code Council (ICC) Codes, and the codes and standards noted below. The latest editions and supplements of these Codes and Standards in effect on the date of the execution of the Contract for Construction shall be applicable unless otherwise designated in the Contract Documents. Codes and standards required by accreditation agencies will also be used unless the ICC requirements are more stringent. In the event that special design features and/or construction systems are not covered in the ICC codes, the applicable edition of the National Fire Protection Association (NFPA) family of standards and/or the NFPA 101 Life Safety Code shall be used.

- .1** ICC International Building Code and reference standards
- .2** ICC International Plumbing Code
- .3** ICC International Mechanical Code
- .4** ICC International Fire Code
- .5** ICC International Fuel Gas Code
- .6** NFPA 70 National Electric Code (NEC)
- .7** Americans with Disabilities Act – Standards for Accessible Design.
- .8** American National Standard Safety Code for Elevators, Dumbwaiters, Escalators, and Moving Walks as published by the American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI) A17.1
- .9** NFPA 101 Life Safety Code (as noted above)
- .10** American Concrete Institute (ACI)
- .11** American National Standards Institute (ANSI)
- .12** American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- .13** American Refrigeration Institute (ARI)
- .14** American Society for Testing and Materials (ASTM)
- .15** Missouri Standard Specification for Highway Construction, Missouri State Highway Commission

- .16 National Electrical Manufacturers Association (NEMA)
- .17 Underwriter's Laboratories, Inc. (UL), Federal Specifications
- .18 Williams Steiger Occupational Safety and Health Act of 1970 (OSHA)

13.9 General Provisions

13.9.1 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

13.9.2 This Contract shall be interpreted, construed, enforced, and regulated under and by the laws of the State of Missouri. Whenever possible, each provision of this Contract shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without invalidating or affecting the remaining provisions of this Contract or valid portions of such provision, which are hereby deemed severable. Contractor and Owner further agree that in the event any provision of this Contract, or a portion thereof, is prohibited by law or found invalid under any law, this Contract shall be reformed to replace such prohibited or invalid provision or portion thereof with a valid and enforceable provision which comes as close as possible to expressing the intention of the prohibited or invalid provision.

13.9.3 Contractor and Owner each agree that the State of Missouri Circuit Court for the County where the Project is located shall have exclusive jurisdiction to resolve all Claims and any issue and disputes between Contractor and Owner. Contractor agrees that it shall not file any petition, complaint, lawsuit or legal proceeding against Owner in any other court other than the State of Missouri Circuit Court for the County where the Project is located.

13.9.4 Owner's total liability to Contractor and anyone claiming by, through, or under Contractor for any Claim, cost, loss, expense, or damage caused in part by the fault of Owner and in part by the fault of Contractor or any other entity or individual shall not exceed the percentage share that Owner's fault bears to the total fault of Owner, Contractor and all other entities and individuals as determined on the basis of comparative fault principles.

13.9.5 Contractor agrees that Owner shall not be liable to Contractor for any special, indirect, incidental, or consequential damage whatsoever, whether caused by

Owner's negligence, fault, errors or omissions, strict liability, breach of contract, breach of warranty or other cause or causes whatsoever. Such special, indirect, incidental or consequential damages include, but are not limited to loss of profits, loss of savings or revenue, loss of anticipated profits, labor inefficiencies, idle equipment, home office overhead, and similar types of damages.

13.9.6 Nothing contained in this Contract, or the Contract Documents shall create any contractual relationship with or cause of action in favor of a third party against the Owner.

13.9.7 No member or officer of the Board of Curators of the University incurs or assumes any individual or personal liability under the Contract or by reason of the default of the Owner in the performance of any terms thereof. Contractor releases and discharges all members or officers of the Board of Curators of the University from any liability as a condition of and as consideration for the award of the Contract to Contractor.

13.9.8 The Contractor hereby binds itself, its partners, successors, assigns and legal representatives to the Owner in respect to covenants, agreements and obligations contained in the Contract Documents. Contractor shall not assign the Contract or proceeds hereof without written consent of the Owner. If Contractor attempts to make such an assignment without such consent, it shall be void and confer no rights on third parties, and Contractor shall nevertheless remain legally responsible for all obligations under the Contract. The Owner's consent to any assignment is conditioned upon Contractor entering into a written assignment which contains the following language: "it is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor and to claims and to liens for services rendered or materials supplied for the performance of the Work required in said Contract in favor of all persons, firms, corporations rendering such services or supplying such materials."

13.10 Certification

13.10.1 The contractor 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 in accordance with Executive Order 12549 (2/18/86).

13.10.2 If this contract is for \$100,000 or more, and if the Contractor is a company with ten (10) or more employees, then Contractor certifies that it, and any company affiliated with it, does not boycott Israel, and will not boycott Israel during the term of this Contract. In this paragraph, the terms "company" and "boycott Israel" shall have the meanings described in Section 34.600 of the Missouri Revised Statutes.

ARTICLE 14
TERMINATION OR SUSPENSION OF THE
CONTRACT

14.1 Termination by Owner for Cause

14.1.1 In addition to other rights and remedies granted to Owner under the Contract Documents and by law, the Owner may terminate the Contract if the Contractor:

- .1 refuses or fails to supply enough properly skilled workers, superintendents, foremen, or managers;
- .2 refuses or fails to supply sufficient or proper materials;
- .3 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .4 disregards laws, ordinances, rules, codes, regulations or orders of an authority having jurisdiction;
- .5 disregards the authority of the Owner's Representative, Architect, or Owner's Authorized Agent;
- .6 breaches any warranty or representations made by the Contractor under or pursuant to the Contract Documents;
- .7 fails to furnish the Owner with assurances satisfactory to the Owner evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents;
- .8 fails after commencement of the Work to proceed continuously with the construction and completion of the Work for more than ten (10) days, except as permitted under the Contract Documents;
- .9 fails to maintain a satisfactory rate of progress with the Work or fails to comply with approved progress schedules; or
- .10 violates in any substantial way any provisions of the Contract Documents.

14.1.2 When any of the above reasons exist, the Owner may, without prejudice to any other rights or remedies of the Owner, terminate this Contract by delivering a written notice of termination to Contractor and Contractor's surety, and may:

- .1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 accept assignment of subcontracts pursuant to Paragraph 5.3; and
- .3 finish the Work by whatever reasonable method the Owner may deem expedient, including turning the Work over to the surety.

14.1.3 The Contractor, in the event of a termination under Section 14.1, shall not be entitled to receive any further payments under the Contract until the Work is completed in its entirety. Then, if the unpaid balance

under the Contract shall exceed all expenses of the Owner in finishing the Work, including additional compensation for the Architects services and expenses made necessary thereby, such excess will be paid to the Contractor; but, if such expenses of Owner to finish the Work shall exceed the unpaid balance, the Contractor and its surety shall be liable for, and shall pay the difference and any damages to the Owner. The obligation of the Contractor and its surety for payment of said amounts shall survive termination of the Contract.

14.1.4 In exercising the Owner's right to secure completion of the Work under any of the provisions hereof, the Owner shall have the right to exercise the Owner's sole discretion as to the manner, methods, and reasonableness of costs of completing the Work.

14.1.5 The rights of the Owner to terminate pursuant to Article 14.1 will be cumulative and not exclusive and shall be in addition to any other remedy provided by law or the Contract Documents.

14.1.6 Should the Contractor fail to achieve Final Completion of the Work within thirty (30) calendar days following the date of Substantial Completion, the Owner may exercise its rights under Article 14.1.

14.2 Suspension by the Owner for Convenience

14.2.1 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.

14.2.2 An adjustment will be made to the Contract Sum for increases in the cost of performance of the Contract caused by suspension, delay or interruption. However, in the event of a suspension under this Article 14.2, Contractor hereby waives and forfeits any claims for payment of any special, indirect, incidental or consequential damages such as lost profits, loss of savings or revenue, loss of anticipated profits, idle labor or equipment, home office overhead, and similar type damages. No adjustment will 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 in whole or in part is responsible, or
- .2 that an equitable adjustment is made or denied under another provision of this Contract.

14.3 Owner's Termination for Convenience

14.3.1 The Owner may, at any time, terminate the Contract in whole or in part for the Owner's convenience and without cause. Termination by the Owner under this Paragraph shall be by a notice of termination delivered to the Contractor specifying the extent of termination and the effective date.

14.3.2 Upon receipt of a notice of termination for convenience, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance

of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

- .1 cease operation as specified in the notice;
- .2 place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete Work not terminated;
- .3 terminate all subcontracts and orders to the extent they relate to the Work terminated;
- .4 proceed to complete the performance of Work not terminated; and
- .5 take actions that may be necessary, or that the Owner may direct, for the protection and preservation of the terminated Work.

14.3.3 Upon such termination, the Contractor shall recover as its sole remedy payment for Work properly performed in connection with the terminated portion of the Work prior to the effective date of termination and for items properly and timely fabricated off the Project site, delivered and stored in accordance with the Owner's instructions and for all Owner approved claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors and suppliers. The Contractor hereby waives and forfeits all other claims for payment and damages, including, without limitation, anticipated profits, consequential damages and other economic losses.

14.3.4 The Owner shall be credited for (1) payments previously made to the Contractor for the terminated portion of the Work, (2) claims which the Owner has against the Contractor under the Contract and (3) the value of the materials, supplies, equipment, or other items that are to be disposed of by the Contractor that are part of the Contract Sum.

14.3.5 Upon determination by a court that termination of Contractor or its successor in interest pursuant to Paragraph 14.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Paragraph 14.3, and Contractor's sole and exclusive remedy for wrongful termination is limited to recovery of the payments permitted for termination for convenience as set forth in Paragraph 14.3.

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SECTION 1.E
SPECIAL CONDITIONS

1. DEFINITIONS

a. "Drawings"

Drawings referred to in and accompanying Project Manual consist of Drawings prepared by and bearing name of below defined Architect, bearing December 7, 2023, CP230851 - South Farm Swine Research & Education Facility – Construct Addition

b. Architect
Clark & Enersen
2020 Baltimore, Suite 300
Kansas City, Missouri 64108
816-474-8237 p.

c. Mechanical & Electrical Engineer
Clark & Enersen
2020 Baltimore, Suite 300
Kansas City, Missouri 64108
816-474-8237 p.

d. Structural Engineer
Leigh & O’Kane
209 SE Douglas
Lee’s Summit MO 64063
816-444-3144 p.

e. Civil Engineer
SK Design Group, Inc.
4600 College Blvd. Suite 100
Overland Park, KS 66211
913-451-1818 p.

f. Other Definitions: See Article 1., General Conditions.

2. SPECIAL SCHEDULING REQUIREMENTS

(1) Contractor will not have access to the construction area prior to Owner’s notice to proceed to perform any demolition or construction activities, unless notified otherwise by Owner’s Representative.

(2) Project sequence and inter-project dependencies must be maintained in successful bidder’s schedule. Schedule development shall include, but not limited to MU work activities of Controls, TAB, 3rd Party Commissioning, and Inspections and Testing.

(3) During the construction period all heating ventilation & air conditioning air distribution system components including but not limited to the air handler, supply & return duct, variable volume devices and dampers shall be protected from environmental contaminants including but not limited to dust, debris and fungi during transportation, installation and project activities prior to system start-up.

(4) Prior to start-up of the HVAC equipment/system, including but not limited to, make-up air units, air handling units, supply, return, and exhaust duct for any purpose, the construction project area shall be complete of all dirty work activities. The entire work area in which the system serves shall be thoroughly cleaned by the contractor.

(5) Owner has specific requirements for notifications regarding coordination and utility shut-downs and tie-ins. These are described further in Division 1

(6) Working Hours

- a) Normal working hours are defined as weekdays, 7:00 am to 5:00 pm.
- b) Night hours are defined as Monday thru Thursday after 5:00 pm and before 6:00 am.
- c) Weekend Hours are defined as after 6:00 pm Friday until 4:00 am Monday

(7) Owner has retained a 3rd party commissioning agent. Contractor shall allow for and incorporate commissioning agent's tasks into their construction schedule.

(8) Utility shut-downs, outages and tie-ins: All such work may be done during normal, night, and/or weekend hours. All such work shall be done continuously until fully restored. Contractor shall submit a written plan outlining the required shut-downs, outages, and tie-in at least fourteen (14) days prior to starting the work. Utility shut-downs shall be reviewed, coordinated and approved by the Owner's Representative. Utility outage request is available from owner and must be filled out by the contractor.

(9) Owner installed equipment provision: owner will complete connections of Owner supplied equipment as coordinated and approved by Owner's Representative.

3. SCOPE OF WORK

a. The Contractor shall furnish all labor, materials, tools, equipment necessary for, and incidental to, construction of this project as indicated on Drawings and specified herein.

b. Work shall include everything requisite and necessary to finish work properly, notwithstanding that every item of labor or materials or accessories required to make project complete may not be specifically mentioned.

c. General Description of Work:

- (1) Project consists of a new swine research building addition to the existing

swine research facility located at Jefferson Farm including associated utility, site work, site paving, and gravel drives.

- (2) Demolition shall consist of site preparation and excavation along with preparation of the exterior wall and adjacent building area for the new addition.
- (3) Architectural work shall consist of new walls, doors, ceilings, broom finished concrete flooring, and casework. New exterior walls will be insulated metal panels attached to CMU bearing walls. Roofing will be exposed fastener metal roofing on underlayment and sheathing. Loose fill insulation will be included in the attic space at the bottom chord of the trusses.
- (4) Structural work shall consist of CIP concrete footings, stoops, slabs and trough drains. CIP slab require slope to drains. CMU bearing walls will support wood roof trusses.
- (5) Mechanical work shall consist of new ground mounted rooftop units, exhaust fans, ductwork, dedicated outside air unit, heat pumps, ceiling cassettes, unit heaters, controls and associated items per the contract documents.
- (6) Electrical work shall consist of new normal and backup power systems including a new generator for the addition. Normal power will be fed from the existing building. Electrical work also consists of new lighting, electrical devices, and fire alarm devices throughout the addition per the contract documents.
- (7) Plumbing work shall consist of all new fixtures, booster pump, mixing valves, piping and associated items per the contract documents.
- (8) Fire protection work shall consist of a new dry pipe fire sprinkler system.

4. LOCATION

Work shall be performed under this Contract on campus of the University of Missouri – Columbia, at South Farm. The building will be located at Jefferson Farm per the contract documents.

5. NUMBER OF CONSTRUCTION DOCUMENTS

- a. The Owner's Representative will furnish the Contractor a digital copy of executed Contract and a complete set of Drawings and Specifications in pdf format.
- b. Hard copy prints of any documents (bid or explanatory) will be printed at the Contractor's expense through a printer of their choosing.
- c. The Owner will furnish explanatory and changed Drawings in pdf format to

Contractor as issued during project.

- d. The Owner will provide electronic data files to the Contractor for their convenience and use in progressing the Work and the preparation of shop drawings or other submittal requirements required for construction of the referenced project. The electronic data files shall reflect Construction Documents and Bid Addenda only. These files will be transmitted subject to the following terms and conditions:
- (1) The Owner makes no representation as to the compatibility of these files with the Contractor's hardware or software.
 - (2) Data contained on these electronic files shall not be used by the Contractor or anyone else for any purpose other than as a convenience in progressing the Work or in the preparation of shop drawings or other required submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at their own sole risk and without liability or legal exposure to Owner. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Owner and its consultants, contractors, agents, employees, and representatives that may arise out of or in connection with the use of the electronic files transmitted.
 - (3) Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless the Owner and its consultants, contractors, agents, employees, and representatives, against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.
 - (4) These electronic files are not contract documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. The Owner makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by the Consultant and the electronic files, the signed and sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents.
 - (5) Because information presented on the electronic files can be modified, unintentionally or otherwise, the Owner reserves the right to remove all indications of ownership and/or involvement from each electronic display.
 - (6) Under no circumstances shall delivery of the electronic files be deemed a sale by the Owner and no warranties are made, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Owner be liable for any loss of profit, or any consequential damages as a result of use or reuse of these electronic files.

6. SUBMITTALS

- a. The Contractor shall submit for approval to the Architect, equipment lists and Shop Drawings, as expeditiously as possible. Failure of the Contractor to submit Shop Drawings in a timely manner will result in the Owner holding back Contractor payments. (See General Conditions)
- b. The material and equipment lists shall be submitted and approved before any material or equipment is purchased and shall be corrected to as-built conditions before the completion of the project.

- c. The Contractor shall submit electronic versions of all required Shop Drawings, material and equipment lists. The Contractor shall upload all Shop Drawings to a secure information sharing website determined by the Owner notifying the Owner and Consultant that these shop drawings are available for review. Each submittal shall have the General Contractors digital stamp affixed to the first page signifying their review and acceptance. Review comments, approvals, and rejections will be posted on this same site with notification to the contractor. Submittals requiring a professional seal shall be submitted hard copy with a manual seal affixed.
 - (1) The Contractor shall identify each submittal item with the following:
 - (a) Project Title and Location
 - (b) Project Number
 - (c) Supplier's Name
 - (d) Manufacturer's Name
 - (e) Contract Specification Section and Article Number
 - (f) Contract Drawing Number
 - (g) Acrobat file name: Spec Section_Times Submitted-Spec Title: 033000_01-Cast In Place Concrete.pdf
 - (2) Reference the accompanying Shop Drawing and Submittal Log at the end of this section (1.E.3) for required submittal information.
- d. The Contractor shall submit to the Architect four (4) bound copies of all required Operating Instructions and Service Manuals for the Architect's and the Owner's sole use prior to completing 50% of the adjusted contract. Payments beyond 50% of the contract amount may be withheld until all Operating Instructions and Service Manuals are received as referenced in the accompanying Operating Instructions and Service Manual Log at the end of this section (1.E.4).
- e. The Contractor shall submit to the Owner's Representative all items referenced in the accompanying Closeout Log (1.E.5) within 30 days following substantial completion of the work. The Owner's Representative will maintain the closeout log and include as an agenda item at all coordination meetings.

7. NOTIFICATION

Before beginning Demolition Work or service outages, the Contractor shall provide, at minimum, seventy-two (72) hours advance notice to Owner's Representative for purpose of verifying utility locations including, but not limited to, gas, telecommunications, electric, water, steam, sewer, and nitrogen. Contractor shall minimize the number of outages, minimize the length of outages and related work shall be continuous until the utility is restored.

8. USE OF PREMISES

- a. Access: Access to construction site shall be as indicated on Drawings and as directed by the Owner's Representative.

- b. Parking:
- (1) Parking must be contained within construction limits. No parking or construction material storage is allowed on University Lane or adjacent roads.
 - (2) Parking or driving on sidewalks, landscaped areas, within fire and service lanes or generally in areas not designated for vehicular traffic is prohibited except as allowed in the contract documents. Violation of this requirement may result in ticketing and/or towing at the vehicle owner's expense and suspension of progress payments.
 - (3) If parking is insufficient, contact project representative.
- c. Storage of materials: The Contractor shall store all materials within project limits. The Contractor shall confine apparatus, materials, and operation of workers to location established by the Owner's Representative. The Contractor shall not unreasonably encumber premises with materials. **In addition, storage trailer locations may be available within 1-1/2 miles of project site as directed by the Owner's Representative.** Storage trailer locations shall be subject to approval by the Owner's Representative and are available to the Contractor without cost.
- d. Utilities: Steam, water, sewer, and electricity can be obtained from existing utilities at locations designated by the Owner's Representative at the following rates:

ELECTRIC*

Demand Rate (Greater than 50 kW Demand):	
Demand Rate Per Max Summer kW (June - September)	\$15.10
Energy Rate Per kWh	\$0.64
Non-Demand Rate (Less than 50 kW Demand):	
Energy Rate Per kWh	\$0.100

STEAM*

For each kLb (1,000 lbs) of steam	\$18.76
For kLb (1,000 lbs) of un-returned condensate	\$1.79

CHILLED WATER*

For each Ton-hour (12,000 Btu/ton) up to 3,000 full load hours.	\$0.335
For each Ton-hour (12,000 Btu/ton) over 3,000 full load hours.	\$0.096
<i>Full Load Hours = Ton Hrs. Used / Peak Tons</i>	

**Steam, Electric & Chilled Water rates are adjusted monthly (up or down) to reflect fuel and purchased utilities market fluctuations.*

WATER -

For each (1,000 Gallons)	\$3.25
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SANITARY SEWER

For each kGal	\$6.45
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Sanitary Sewer charges for payment to City of Columbia are calculated using actual water use for September 2020 through August 2021. The new volume calculation will begin with the October utility bill.

STORM SEWER

For each 100 square feet of impervious surface area	\$0.267
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FY22 Storm sewer charges for payment to City of Columbia are based on impervious surface as of January 2021.

Provisions for obtaining power, including temporary extensions, shall be furnished and maintained by the Contractor. Upon completion of the work, such extensions shall be removed and any damage caused by use of such extensions shall be repaired to the satisfaction of the Owner's Representative, at no cost to the Owner.

- e. Restroom: The Contractor shall provide and maintain, in a sanitary condition, chemical type portable toilet facilities at work site for use by his personnel. Toilets and toilet location shall be subject to approval by the Owner's Representative.
- f. Smoking is prohibited at the University of Missouri and all properties owned, operated, leased or controlled by the University of Missouri. Violation of the policy is defined as smoking any tobacco products, including e-cigarettes.
- g. Landfill: The Contractor shall not use the Owner's landfill. Dumping or disposal of excavated or demolition materials on Owner's property shall not be permitted.

The Contractor shall remove and legally dispose of excavated or demolished materials off the Owner's property.

- h. Care of Project Work Site: The contractor shall be responsible for maintaining the construction site in a reasonably neat and orderly condition by regular cleaning and mowing of the premises as determined by the Owner's Representative.
- i. Discharge to Sewer Request: The University of Missouri's MS4 permit and NPDES Storm Water Discharge Permits along with the City of Columbia's POTW Operating Permit as well as local ordinances, and state and federal environmental regulations prohibit hazardous materials from being disposed into either the storm water or sanitary sewer systems. Unless specifically approved, all chemical products such as paints, dyes, lawn care products, maintenance products, and oil is are prohibited from drain disposal. Any product, including contaminated water, being discarded into the storm water or sanitary sewer systems requires written approval from the Owner through a formal "Discharge to Sewer Request" form obtained at [Discharge to Sewer Request Form](#). The contractor should submit the form to the Owner's Representative, not to the Department of Environmental Health and Safety as the form indicates.
- j. All concrete waste material including washout water shall be totally contained and removed from the Owner's property.
- k. Artifacts Found During Construction: Contractor shall immediately notify the Owner's Representative when artifacts are uncovered or found during the demolition or construction process. Artifacts include, but are not limited to, tools, drawings (construction or other), photographs, books and other objects/devices which may hold historical importance/significance. Do not remove or disturb the object(s) in question. Artifacts are not considered part of demolished materials and shall remain the property of the University of Missouri.
- l. **"Permit Required Confined Space" Entry Communication and Coordination**
(See OSHA 1926 subpart aa – Construction Confined Space for the definition of "permit required confined spaces" - Note: OSHA does not apply to the University. However, the University will provide a list of all known "permit required confined spaces")

There are no known "permit required confined spaces" within the project limits. Each contractor shall conduct a survey to confirm whether or not any confined spaces exist within the project limits. It is incumbent upon each contractor to list all "permit required spaces".

The Contractor shall notify the Owner's Representative if 1) conditions change resulting in a non-permit required confined space being reclassified to a "permit required confined space" after evaluation of the space by a competent person; 2) a space previously thought to be non-permit required space is classified as a "permit required confined space"; or 3) during the course of construction a "permit required confined space" is created after evaluation by a competent person.

The Contractor shall submit to the Owner's Representative a copy of the cancelled confined space entry permit and a written report summarizing the permit space program followed and all hazards confronted or created during entry operations. This information shall be submitted within one week of cancelling the permit.

- m. Contractors and Subcontractors shall not have access within 10'-0" of the existing South Farm Research & Education building if they have been in contact with or proximity to swine, swine carcasses, animal diagnostic laboratories, and veterinary facilities within 48 hours of arrival to the construction site.
- n. Contractors and Subcontractors requiring access to research areas of the existing South Farm Research & Education building must follow the policies as defined by South Farm. Escorted access by a South Farm representatives will be required for existing research areas.

9. PROTECTION OF OWNER'S PROPERTY

- a. The Contractor shall be responsible for repair of damage to building exterior and interior, drives, curbs, streets, walks, grass, shrubbery and trees, which was caused by workmen or equipment employed during progress of work. All such repairs shall be made to satisfaction of the Owner's Representative, at no cost to the Owner, or reimburse the Owner if the Owner elects to make repairs. For landscape damage, the Owner shall make such repairs. Compensation for these repairs shall be determined by the Owner's Representative using the "Valuation of Landscape Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.
- b. Construction Project Fencing:
 - (1) Fencing requirements, as indicated on Drawings and/or described in Specifications and where necessary to protect public and Owner's property shall be constructed of woven wire or plastic woven fencing not less than five (5) feet in height and supported by metal tee posts anchored securely in ground at not more than ten (10) foot intervals.
 - (2) Using existing landmarks, lamp posts, trees or other Owner property for support of fencing is strictly prohibited unless a written waiver is obtained from Owner's Representative.
 - (3) Use of ribbon, snow fence, chicken wire, rope, and wooden barricades as fencing is prohibited.
 - (4) Fencing shall be maintained in an "as-installed" condition throughout the life of the project.
 - (5) The Contractor may use used fencing provided it is in good condition and is satisfactory to the Owner's Representative.

- c. Preserving and Protecting Existing Vegetation:
 - (1) Protection and compensation for damages:
 - (a) Trees and shrubs within work area designated to remain shall be protected from damage during construction by fixed chain link fencing or armoring as indicated on Drawings or specified herein. Plant protection devices shall be installed before work has begun and shall be maintained for duration of work unless otherwise directed by Owner's Representative.
 - (b) In the event that damage(s) to the Owner's trees, shrubs or vegetation occurs as a result of the Contractor's unauthorized operations, the Contractor shall pay or allow to the Owner compensation for said damage(s). Compensation shall be determined by the Owner's Representative using the "Valuation of Landscape Trees, Shrubs, and other Plants" as published by the International Society of Arboriculture, as last revised.
 - (2) Plants within work area designated for removal shall be removed by Contractor.
 - (3) To prevent compaction of soil over tree roots, vehicles or equipment shall not at any time park or travel over, nor shall any materials be stored within drip line of trees designated to remain.
 - (4) Owner's Representative will stop work immediately when proper measures are not being employed to protect trees and shrubs. Contractor will be notified to resume work after required protection measures are implemented.
 - (5) Pruning of limbs necessary to repair damage or provide clearance for work shall be done by the MU Landscape Services Department at the direction of the Owner's Representative. Limbs shall be cut off cleanly and cut surfaces treated according to established horticultural standards.
 - (6) Contractor shall repair tire ruts and other damages to existing lawn areas. Repairs shall match surrounding area.

10. SUBSTITUTIONS and EQUALS

- a. Substitutions are defined in General Conditions article 3.11.8 for and Equals are defined General Conditions Article 3.12 .
- b. Use of materials, products or equipment other than those named and described in

the Contract Documents are substitutions and/or equal. Substitutions and/or equals submitted during the bidding period shall be received by both the Architect and the Owner at least ten calendar days prior to the date for receipt of bids. To be considered, bidder's proposal shall include a complete description of the proposed substitution and/or equal and a comparison of significant qualities of the proposed substitution and/or equal with those specified including drawings, performance and test data, and other information necessary for an evaluation. The Architect's decision on the approval or disapproval of a proposed substitution and/or equal shall be final.

- c. No substitutions and/or equal will be allowed for the following items:

<u>Item</u>	<u>Specification Section</u>
Lock Cylinders - Best	08 71 00
Control System – Johnson Controls	23 09 00
Fire Alarm Systems - FCI	28 31 11

11. CODES AND STANDARDS

The Contractor shall comply with applicable codes and standards as listed in General Conditions. The following codes and standards shall also apply:

- a. City of Columbia - Sewer Line Installation Standards - Department of Public Works

“All sanitary sewer construction shall be in accordance with the City of Columbia Specifications and Standards and in conformance with the rules and regulations of the Missouri Clean Water Commission.”

12. PERMITS

- a. The Contractor shall comply with applicable codes and standards as listed in the Contract Documents, and General Conditions.
- b. All permits, including, but not limited to Hot Work, Fire Alarm, and Energized Work shall be coordinated and scheduled with the Owner's representative and or his designee prior to commencement of the work.
- c. Before commencement of Boilers, Water Heaters or Pressure Vessels the Contractor must obtain an installation permit from the State of Missouri, Division of Fire Safety, Boiler and Pressure Unit as required by 11 CSR 40-2.010 through 11 CSR 40-2.065. The permit applications are available at <http://www.dfs.dps.mo.gov/programs/bpv/> .
- d. Hot Work Permit: Contractor's hot work permitting process must comply with requirements of NFPA 51B. Hot Work Permits must be requested from and completed by Owner's Representative, posted and signed off by Contractor's performing work involving open flames or work that produces heat and/or sparks. This includes, but is not limited to, brazing, cutting, soldering, thawing pipes, torch applied roofing and welding within Hospital property.

- e. Energized Work Permit: Contractors are required to comply with applicable Safety and Health regulations such as OSHA, NFPA, and EPA. Energized work is to be avoided unless absolutely necessary. Live parts shall be de-energized before working on or near them unless an exception is warranted per 2004 for later edition of NFPA 70E. When working on or near live parts (including testing and troubleshooting), contractor shall select the appropriate Personal Protective Equipment and follow an electrical work safety program per NFPA 70E. If unable to determine the necessary level of protection using the NFPA 70E tables, an Arc Flash Hazard Electrical Analysis must be performed by a Professional Electrical Engineer licensed in the state of Missouri. A copy of the Contractor's completed Energized Electrical Work Permit shall be submitted to the Owner's Representative before any Energized Work begins. Contractors may be required to submit copies of their Safety Program to the Owner's Representative upon request.

13. SPECIALTIES

- a. Owner furnished topsoil: The contractor shall place Owner provided topsoil and grade to the finish elevation as indicated in the contract. The Owner will deliver the topsoil to the project site in the quantity required. The contractor is required to notify the Owner a minimum of five working days in advance of the needed topsoil. Topsoil shall be placed with rubber tracked equipment to minimize compaction. Placement shall be sequenced to minimize compaction and damage to the topsoil. Topsoil or subsoil damaged, contaminated, or compacted during topsoil placement shall be repaired or replaced as directed by the Owner's Representative. Hand work shall be required next to adjacent structures and around utilities. Erosion control measures shall be maintained throughout and after topsoil placement.
 - (1) The sub-grade is to be left at minus six inches (6") in all areas unless indicated otherwise. All planting bed sub-grades are to be left a minus eighteen inches (18"). The contractor is to remove all deleterious material from the sub-grade prior to placing topsoil. All subgrade areas shall contain at least 6" of subsoil, (ie. cover clean rock backfilled areas). All subgrade areas shall be "ripped" a minimum of 6" deep and a maximum of 12" apart in opposite directions with minimal tire traffic to follow. All exposed deleterious material and unacceptable rock shall be removed.
 - (2) The contractor shall adjust all yard boxes valve boxes, pull boxes, cleanouts, and manhole lid rings etc. (includes irrigation, sewers, water and electric), to the indicated finish grade.
 - (3) Final plantings will be by the Owner. The Owner will water and maintain all seed, sod and landscaping.

14. PRE-BID INSPECTION

All pre-bid inspections of work areas shall be scheduled with pre-bid inspection guide, telephone: (573) 882-2228.

15. ROOF WARRANTY REQUIREMENT

- a. The Contractor shall submit, before the first progress payment, a copy of University of Missouri Roof System Manufacturer's Certification, which shall be manually signed by an authorized representative of Manufacturer of each proposed roofing system. Certification shall have original signature.
- b. Following final inspection and acceptance of the roofing system(s) by the Owner and the roofing system manufacturer(s), the Contractor shall submit a manually signed standard warranty agreement provided and executed by the roofing system manufacturer for each roofing system provided. Standard warranty agreement(s) shall be of the duration specified in Division 7.
- c. University of Missouri three (3) year Contractor's Roofing/Flashing/ Sheetmetal Guarantee shall be signed by the roofing contractor after final inspection and acceptance of each roofing system by Manufacturer and by Owner.
- d. The Roofing contractor or subcontractor shall provide the Owner with an Application for a Roof Warranty.

16. MODIFICATIONS TO INFORMATION TO BIDDERS

a. Information to Bidders:

- (1) Referenced Information to Bidders, Page IFB/5.
Add new Article 15.8.5 as follows:

15.8.5 Within 48 hours of the receipt of bids, the apparent low bidder shall submit to the Director of Facilities Planning and Development an "Affidavit of Supplier Diversity Participation" for every diverse subcontractor or supplier the bidder intends to award work to on the contract. The affidavit will be signed by both the bidder and the diverse firm.

17. MODIFICATION TO INFORMATION FOR BIDDERS: BIDDERS STATEMENT OF QUALIFICATIONS

- a. Not Used

18. MODIFICATIONS TO GENERAL CONDITIONS

- a. Not Used

19. PROJECT SCHEDULING

The project scheduling specification for the project are included immediately after the Special Conditions. For this project the Contractor shall meet the following scheduling requirements.

Option 3: Contractor Schedule – Contractor is responsible for the schedule and he may provide with in-house personnel or hire a third party scheduling consultant. See Contractor Schedule Specification included in these documents.

20. PROJECT COORDINATION

- a. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
 - (1) Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - (2) Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 - (3) Make provisions to accommodate items scheduled for later installation.
- b. Coordination Drawings: Within thirty (30) days of Notice to Proceed provide coordination drawings for the integration of the Work, including work first shown in detail on shop drawings or product data. Show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated.
 - (1) Show the interrelationship of components shown on separate shop drawings.
 - (2) Indicate required installation sequences.
 - (3) Call attention in advance to Architect of any dimensional or detail information needed to complete the coordination drawings.

21. PROJECT PARTNERING

- a. Not used

22. VALUE ENGINEERING

- a. Not used

23. BUILDING SYSTEM COMMISSIONING

- a. Contractor shall provide all personnel and equipment required to complete the commissioning activities referenced in the Commissioning Plan. The requirements of the commissioning plan shall be completed in their entirety before substantial completion and submitted as referenced in the Closeout Log.
- b. The contractor shall designate a competent person, separate from the superintendent or Project Manager, to act as the contractor's commissioning coordinator. The commissioning coordinator is responsible for planning, scheduling, coordinating, conducting and verifying all commissioning activities required by the commissioning plan and ensuring all building systems are complete, operable and ready for use by the Owner. At a minimum, building ventilation systems, chilled/hot water generation systems, hydronic distribution systems, power distributions systems and fire detection and alarm systems, as applicable.

24. MECHANICAL, ELECTRICAL, PLUMBING (MEP) PRE-INSTALLATION MEETING(S)

- a. Before the start of MEP installation, the Owner's Representative will convene an MEP pre-installation meeting. Meeting participants to include contractor (including MEP subcontractors), Owner's Representative and additional contractor and University operational staff invited by the Owner's Representative. Topics will include underground rough-ins, steam piping, chilled water piping, sprinkler piping, hot water piping, electrical system, duct, telephone/data wiring, control wiring. Additional meetings will be conducted as required for the review of coordination drawings and scope specific installations. Cross section drawings of corridor ceilings and other congested areas will be of highest priority and will be reviewed prior to the start of installations in the affected areas. Meeting minutes and sign-up sheet will be transcribed by contractor and distributed to attendees.

25. COST BREAKOUT FOR OWNER'S ACCOUNTING PURPOSES

- a. Not used

26. PROJECT MANAGEMENT/COMMUNICATION REQUIREMENTS

- a. The Contractor shall be represented at the site by both a competent full-time Project Manager and a full-time, competent superintendent with no other assigned duties or responsibilities from the beginning of the work until its final acceptance, unless otherwise permitted by the Owner's Representative. The superintendent for the Contractor for the general building work shall exercise general supervision over all subcontractors of any tier engaged on the work with decision-making authority of the Contractor.
- b. The Contractor shall use a current industry standard (Primavera, Microsoft Project, etc.) project scheduling software which provides as a minimum: Critical paths, milestones, estimated and actual start and completion dates, scheduled vs. actual

progress, and detailed task and subtask breakdown. The following schedules shall be provided as a minimum and kept current: Overall project schedule, four- (4-) week look-ahead, and two- (2-) week look-ahead.

- c. The Contractor shall furnish on-site Internet access for use by his Project Manager and superintendent. The contractor shall utilize the Owner's secure information sharing system for submittals, construction payment process, change orders, RFI's/ASI's, O&M manuals and all other project manual requirements as directed by the Owner's Representative. Field staff are also required to utilize this software as directed by the Owner's Representative.
- d. The Contractor shall provide at least two (2) job site FM handheld communication radios (walkie-talkies) for use by the on-site superintendent and the Owner's Representative or the Contractor shall provide his on-site superintendent with a handheld cellular telephone

27. SAFETY PRECAUTIONS AND PROGRAMS

- a. The Bidder's Statement of Qualifications includes a requirement that the Bidder provide its Worker's Compensation Experience Modification Rates (EMR) and Incidence Rates for the three recent years. The Bidder shall also include the EMR and Incidence Rates of listed major subcontractors on the Bid for Lump Sum Contract. If the EMR exceeds 1 or the Incidence Rate exceeds 13, the Contractor or major subcontractor shall take additional safety measures including, but not limited to, developing a site specific safety plan and assigning a Safety Manager to the Project to perform inspections on a schedule as determined acceptable by the Owner with written reports to be submitted to the Owner. The Owner reserves the right to reject a Bidder or major subcontractor whose rates exceed these stated rates.
- b. The contractor shall provide Emergency Contact Information for the Contractor's on-site staff and home office management as well as contact information for all major subcontractor personnel. This information shall contain business and personal phone numbers for each individual for contact during or after hours in case of an emergency. This information shall be submitted within 15 days of the Notice to Proceed.

28. HOT WORK PERMITTING AND GENERAL REQUIREMENTS

Hot work Requirements: The contractor shall comply with the following hot work requirements and the requirements of the International Fire Code and 2014 NFPA 51B.

- a. Hot work shall be defined as any work involving burning, welding, grinding, cutting, or similar operations that are capable of initiating fires or explosions.
- b. The Contractor shall utilize the hot work permit decision tree and permit provided in the 2014 NFPA 51B for all Hot Work operations.
- c. A hot work permit shall be used on all hot work performed outside a designated hot

work area. The hot work permit shall be posted and clearly visible within proximity of the hot work area. The hot work permit authorizing individual (PAI) shall be as designated by the Contractor.

- d. Notify the Owner's Representative 24 hours prior to starting hot work in buildings with operational fire alarm or fire suppression systems. The Owner's Representative will coordinate the appropriate system outage with Campus Maintenance personnel.
- e. Unless otherwise instructed by the Owner's Representative, the Contractor shall post a copy of each completed hot work permit to the Owner's project management file system the following business day.

29. GENERAL REQUIREMENTS FOR CRANE AND HOISTING OPERATIONS

All crane and hoisting operations shall be performed in compliance with OSHA 29 CFR 1926. All Operators, riggers, and signal persons must have the proper qualifications and training necessary to perform the intended hoisting activities for this project.

- a. Only fully certified and evaluated Operators shall perform equipment operations. Operators in an "Operator in Training" status shall not be used.
- b. Submittal requirements:
 - 1. Submit copies of Operator certifications, licenses, and evaluations to the Owners Representative.
 - 2. Submit Rigger and Signal Person qualifications to the Owners Representative.
 - 3. Unless otherwise directed by the Owners Representative, submit a lift plan and conduct a lift coordination meeting for hoisting or crane operations for any lift greater than 2,000 pounds, or for any multi pick lift. Include protective measures for existing underground utilities, occupied buildings, pedestrian and vehicle pathways, adjacent buildings and overhead power lines. If the lift is to occur over an occupied building, provide a registered structural engineer's review and verification that the building can resist the impact of a dropped load for the intended lift. If evacuation of an occupied building is necessary to conduct the lift, the decision for building evacuation or scheduling the lift for off-hours will be determined by the Owner.

30. CONSTRUCTION WASTE MANAGEMENT

The goal of Construction Waste Management is to divert waste from the sanitary landfill. This shall be accomplished through reuse, recycling and/or salvage of non-hazardous construction and demolition debris to the greatest extent practical. Track and report all efforts related to reuse, recycling and/or salvage materials from the project (including clean fill material). Report all material types and weights, where material was diverted, type of diversion, documentation of diversion (eg: waste or recycling tickets),

and applicable dates. In order to calculate the diversion percentage, total weights of all non-hazardous landfill material must be reported. This information shall be updated monthly utilizing the [Construction Waste Management Worksheet](http://www.cf.missouri.edu/cf/pdc/contractor_information) provided here: [for MU] http://www.cf.missouri.edu/cf/pdc/contractor_information. Copies of all applicable receipts, tickets and tracking logs shall be uploaded to the Owner's information sharing website or reported as required by the Construction Project Manager.

(A summary worksheet is required prior to substantial completion).

31. WARRANTY WALKTHROUGH

Contractor shall attend a walk-thru with the Owner at 11 months after acceptance to review and document any warranty items to be addressed as part of the 12 month warranty stated in article 3.1 of the General Conditions.

END OF SECTION

Option #3 – Contractor Schedule

1. GENERAL

a) Time is of the essence for this contract.

The time frames spelled out in this contract are essential to the success of this project. The University understands that effective schedule management, in accordance with the General Conditions and these Special Conditions is necessary to insure that the critical milestone and end dates spelled out in the contract are achieved.

b) Related Documents

Drawings and general provisions of the Contract, including General Conditions' Article 3.17 shall apply to this Section.

c) Stakeholders

A Stakeholder is anyone with a stake in the outcome of the Project, including the University, the University Department utilizing the facility, the Design Professionals, the Contractor and subcontractors.

d) Weather

(1) Contractor acknowledges that there will be days in which work cannot be completed due to the weather, and that a certain number of these lost days are to be expected under normal weather conditions in Missouri.

(2) Rather than speculate as to what comprises "normal" weather at the location of the project, Contractor agrees that it will assume a total of 44 lost days due to weather over the course of a calendar year, and include same in its as planned schedule. For projects of less than a calendar year, lost weather days should be prorated for the months of construction in accordance with the following schedule.

(3) Anticipated weather days for allocation/proration only. For projects lasting 12 months or longer, the 44 days per year plus whatever additional months are included will constitute normal weather.

Jan – 5 days	Feb – 5 days	Mar – 4 days	Apr – 4 days
May – 3 days	Jun – 3 days	Jul – 2 days	Aug – 2 days
Sep – 3 days	Oct – 4 days	Nov – 4 days	Dec – 5 days

2. SCHEDULING PROCESS

a) The intent of this section is to insure that a well-conceived plan, that addresses the milestone and completion dates spelled out in these documents, is developed with input from all stakeholders in the project. Input is limited to all reasonable requests that are consistent with the requirements of the contract documents, and do not prejudice the Contractor's ability to perform its work consistent with the contract documents.

Further, the plan must be documented in an understandable format that allows for each stakeholder in the project to understand the plan for the construction and/or renovation contained in the Project.

b) Contractor Requirements

(1) Schedule Development

Contractor shall prepare the Project Schedule using Primavera P3 or Oracle P6.

(2) Schedule Development

Within 4 weeks of the NTP, contractor shall prepare a schedule, in CPM format, that reflects the contractor's and each subcontractors plan for performing the contract work.

Contractor shall review each major subcontractor's schedule with the sub and obtain the subcontractor's concurrence with the schedule, prior to submitting to the University.

(3) Schedule Updates.

- (a) Schedule Updates will be conducted once a month, at a minimum.

Actual Start and Finish dates should be recorded regularly during the month. Percent Complete, or Remaining Duration shall be updated as of the data date, just prior to Contractor's submittal of the update data.

- (b) Contractor will copy the previous months schedule and will input update information into the new monthly update version.

- (c) Contractor will meet with the Owner's Representative to review the draft of the updated schedule. At this meeting, Owner's Representative and Contractor will:

(i) Review out of sequence progress, making adjustments as necessary,

(ii) Add any fragments necessary to describe changes or other impacts to the project schedule and

(iii) Review the resultant critical and near critical paths to determine any impact of the occurrences encountered over the last month.

(4) Schedule Narrative

After finalization of the update, the Contractor will prepare a Narrative that describes progress for the month, impacts to the schedule and an assessment as to the Contractor's entitlement to a time extension for occurrences beyond its control during the month and submit in accordance with this Section.

(5) Progress Meetings

- (a) Review the updated schedule at each monthly progress meeting. Payments to the Contractor may be suspended if the progress schedule is not adequately updated to reflect actual conditions.

- (b) Submit progress schedules to subcontractors to permit coordinating their progress schedules to the general construction work. Include 4 week look ahead schedules to allow subs to focus on critical upcoming work.

3. CRITICAL PATH METHOD (CPM)

- a) This Section includes administrative and procedural requirements for the critical path method (CPM) of scheduling and reporting progress of the Work.

- b) Refer to the General and Special Conditions and the Agreement for definitions and specific dates of Contract Time.

- c) Critical Path Method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships and network calculations determine when activities can be performed and the critical path of the Project.

- d) Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall project duration.

- e) Network Diagram: A graphic diagram of a network schedule, showing the activities and activity relationships.

- f) Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling, the construction project. Activities included in a construction schedule consume time and resources.

- g) Critical activities are activities on the critical path.

- h) Predecessor activity is an activity that must be completed before a given activity can be started.

- i) Milestone: A key or critical point in time for reference or measurement.

- j) Float or Slack Time: The measure of leeway in activity performance. Accumulative float time is not for the exclusive use or benefit of the Owner or Contractor, but is a project resource available to both parties as needed to meet contract milestones and the completion date.

- k) Total float is herein defined as the measure of leeway in starting or completing an activity without adversely affecting the planned project completion date.

- l) Weather: Adverse weather that is normal for the area must be taken into account in the Contractor's Project Schedule. See 1.d.3, above.
- m) Force Majeure Event: Any event that delays the project but is beyond the control and/or contractual responsibility of either party.
- n) Schedule shall including the following, in addition to Contractor's work.
 - (1) Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:
 - (a) Requirements for phased completion and milestone dates.
 - (b) Work by separate contractors.
 - (c) Work by the Owner.
 - (d) Coordination with existing construction.
 - (e) Limitations of continued occupancies.
 - (f) Uninterruptible services.
 - (g) Partial occupancy prior to Substantial Completion.
 - (h) Area Separations: Use Activity Codes to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.

4. TIME EXTENSION REQUESTS

- a) Refer to General Conditions of the Contract for Construction, Article 4.7 Claims for Additional Time.
- b) Changes or Other Impacts to the Contractor's Work Plan

The Owner will consider and evaluate requests for time extensions due to changes or other events beyond the control of the Contractor on a monthly basis only, with the submission of the Contractor's updated schedule, in conjunction with the monthly application for payment. The Update must include:

 - (1) An activity depicting the event(s) impacting the Contractors work plan shall be added to the CPM schedule, using the actual start date of the impact, along with actually required predecessors and successors.
 - (2) After the addition of the impact activity(ies), the Contractor will identify subsequent activities on the critical path, with finish to start relationships that can be realistically adjusted to overlap using good, standard construction practice.
 - (a) If the adjustments above result in the completion date being brought back within the contract time period, no adjustment will be made in the contract time.
 - (b) If the adjustments above still result in a completion date beyond the contract completion date, the delay shall be deemed excusable and the contract completion date shall be extended by the number of days indicated by the analysis.
 - (c) Contractor agrees to continue to utilize its best efforts to make up the time caused by the delays. However the Contractor is not expected to expend costs not contemplated in its contract, in making those efforts.
- c) Questions of compensability of any delays shall be held until the actual completion of the project. If the actual substantial completion date of the project based on excusable delays, excluding weather delays, exceeds the original contract completion date, AND there are no delays that are the responsibility of the contractor to consider, the delays days shall be considered compensable. The actual costs, if any, of the Contractor's time sensitive jobsite supervision and general conditions costs, shall be quantified and a change order issued for these costs.

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UNIVERSITY OF MISSOURI
ROOF SYSTEM MANUFACTURERS CERTIFICATION
(Revised 12/94)

TO: _____ Title _____
Project No. _____
Location _____

Our technical staff has examined the Architect/Engineer's Drawings, Specifications and required warranty for the roofing work on this project. We do not wholly endorse the building design or any materials or services not part of our advertised roofing system.

CERTIFICATION

We hereby certify that:

1. All materials we will furnish and deliver to the project shall be of good merchantable quality, shall meet or exceed the Specifications required and shall, if properly applied by one of our approved roofing applicator firms in accord with our instructions, provide a sound weather/watertight roofing system.
2. Upon completion of the installation in accord with the Drawings and specifications and our recommended installation procedures, we shall issue a total system warranty specified in the project Specifications.
3. The Drawings and Specifications follow the recommendations of our roofing manual for this type of roofing system with:

No exceptions.

The following exceptions: (The roofing system will be approved for this project if the following changes are made to the Contract Documents. The bid provided with this Document includes the required changes).

NOTE: Exceptions may cause Owner to reject bid.
Exceptions are as follows:

4. The Warranty will be issued for the following proposed roofing system:

ROOFING SYSTEM MANUFACTURER: _____

Authorized Signature: _____

Title: _____ Date _____

Telephone Number: () _____

Fax Number: () _____

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UNIVERSITY OF MISSOURI
CONTRACTORS ROOFING/FLASHING/SHEET METAL GUARANTEE
(Revised 12/94)

WHEREAS (NAME AND ADDRESS OF COMPANY)

herein referred to as Roofing Contractor, certify that they have furnished and installed all roofing, flashing, sheet metal and related components in accordance with the Contract Documents and as required by the Roofing System Manufacturer's installation instructions on the facility described below:

Facility: _____

Owner: University of Missouri-(CAMPUS)
 (CAMPUS ADDRESS)

Date of Full Completion: _____

Approximate Area of Roof: _____

Type of Roofing Material: _____

Manufacturer's Specification Number: _____

Thickness and Type of Roof Insulation: _____

NOW, THEREFORE, Roofing Contractor guaranties to the Owner, subject only to the exclusions stated hereinafter, that all roofing, flashing and sheetmetal work is fully and integrally watertight and is free from faults and defects in material or workmanship, and is guaranteed for a period of three (3) years from date of full completion of work.

EXCLUSIONS: This guarantee does not cover, and Roofing Contractor shall not be liable for the following:

1. Damage to the roofing system caused by fire, lightning, tornado, hurricane or hailstorm.
2. Damage to roofing system caused by significant settlement, distortion or failure of roof deck, walls, or foundations of building, excepting normal building expansion and contraction is not a part of this exclusion.
3. Abuse by the Owner and/or third parties.

REPAIRS: Owner shall promptly notify Roofing Contractor, in writing, of the need for repair of roofing, flashing, or sheet metal:

1. Roofing Contractor, within eight (8) hours after receipt of such notice, shall make emergency repairs at its expense, as required to render the facility watertight.
2. Within five (5) days after receipt of such notice, Roofing Contractor shall at its expense correct any faults or defects in material or workmanship.
3. Should needed repairs not be covered by this guarantee, Roofing Contractor, after having obtained Owner's written consent, shall make such repairs at Owner's expense. Following said repairs, this guarantee shall thereafter remain in effect for the unexpired portion of the original term. If Owner does not so consent or repairs are made by others than the Roofing Contractor, this guarantee shall terminate for those parts of the roof affected by the repair.
4. In the event that Owner has notified the Roofing Contractor of the need for repairs and (i) Roofing Contractor does not immediately make repairs, or (ii) Roofing Contractor disclaims responsibility for the repairs and Owner disagrees, or (iii) Owner considers Roofing Contractor's quoted cost for repairs not covered by this guarantee to be unreasonable and, an emergency condition exists which requires prompt repair to avoid

substantial damage or loss to Owner, then, Owner may make such temporary repairs as he finds necessary and such action shall not be a breach of the provisions of this guarantee.

ANNUAL INSPECTIONS: Roofing Contractor shall inspect roof installation prior to each of the three anniversary dates from date of full completion of the work.

1. Inspection team to include Roofing Contractor, Roof Manufacturer, and Owner=s Representative.
2. Inspection of total roof system will be included in the annual inspections.
3. All defects in total roof system will be corrected by the Roofing Contractor within 30 days of inspection.
4. Roof manufacturer will certify by a written report that roof inspection has been completed, defects are acknowledged, and will warrant any repairs.
5. All corrective work completed by Roofing Contractor shall be warranted as approved by the Roofing Manufacturer.

ROOF MODIFICATION: Should Owner require work to be done on roof of said facility including modifications, alternations, extensions or additions to roof and including installation of vents, platforms, equipment, bracings or fastenings, Owner shall notify Roofing Contractor and give Roofing Contractor an opportunity to make recommendations as to methods necessary to safeguard against damage to roofing covered by this guarantee. Failure of Owner to give Roofing Contractor such opportunity or failure to follow methods recommended by Roofing Contractor shall render this guarantee null and void to the extent such failure should result in damage to roofing covered by this guarantee.

NOTICES: Notification of Roofing Contractor by Owner, shall be fulfilled by sending notice to Roofing Contractor.

IN WITNESS WHEREOF, we set our hands this ____ day of _____, 20__.

By: _____

Title: _____

For Roofing Contractor

Name: _____

Address: _____

Phone: _____

SHOP DRAWING AND SUBMITTAL LOG

Project: South Farm Swine Research & Education Facility – Construct Addition

Project Number: CP230851

Contractor:

Section	Description	Contractor	Date Rec'd	#	Date Sent to Cons.	Date Ret'd	Remarks	Date ret'd	Cont'r	Copies To	
										Owner	File
032000	Product Data, Shop drawings, Construction Joint layout, Quals, Certs, Reports										
033000	Product Data, Design Mixtures, Shop drawings, Construction Joint layout										
042200	Product Data, Shop Drawings, Certs,										
055000	Product Data, Shop Drawings										
061000	Product Data, Fastener Patters, Certs, reports										
061600	Product Data, Reports										
061753	Product Data, Shop Drawings, Delegated Design, Quals, Certs										
066000	Product Data, Shop Drawings, Samples,										
071113	Product Data										
071326	Product Data, Shop Drawings, Samples, Quals, Warranties										
072100	Product Data, Reports										
074113.13	Product Data, Shop Drawings, Samples, Reports, Quals, Warranties										
074219	Product Data, Shop Drawings, Samples, Quals, Reports,										
074293	Product Data, Shop Drawings, Samples, Quals, Reports,										

076200	Product Data, Quals, Certs, Reports, Shop Drawings, Samples, Warranties										
077100	Product Data, Quals, Certs, Reports, Shop Drawings, Samples, Warranties										
077200	Product Data, Shop Drawings, Samples, Coordination Drawings, Warranty										
077253	Product Data, Shop Drawings, Reports,										
079200	Product Data, Reports, Samples, Warranty										
081119	Product Data, Reports, Certs, Shop Drawings, Schedule										
081613	Product Data, Reports, Certs, Shop Drawings, Schedule										
083113	Product Data, Shop Drawing, Product Schedule										
087111	Product Data, Hardware Schedule										
088000	Product Data, Quals, Certs, Reports, Adhesion Test Report, Samples, Warranties										
092900	Product Data, Samples										
096733	Product Data, Samples, Test Data. Quals, Certs										
099600	Product Data, Samples, Product List										
102800	Product Data, Product Schedule,										
104413	Product Data, Product Schedule										
123553	Product Data, Quals, Certs, Reports, Shop Drawings, Samples,										
211313	Product Data, Quals, Certs, Reports, Shop Drawings, Delegated Design Submittal, Coordination Drawings, Approved Sprinkler Drawings										
220500	Product Data, Pipe Pressure Test Logs, Coordination Drawings, Welding Certificates										
220519	Shop Drawings										
220529	Product Data, Shop Drawings										

220553	Shop Drawings, Equipment Label Schedule, Valve Numbering & Schedule,										
220719	Product Data, Shop Drawings										
221119	Product Data, Shop Drawings, Operation & Maintenance Data,										
224000	Product Data, Shop Drawings, Wiring Diagrams, Operation & Maintenance Data										
230500	Coordination Drawings, Coordination drawings for access panel and door locations, Welding Certificates, Pipe Pressure Test Logs,										
230519	Product Data, Shop Drawings, Operation & Maintenance Data										
230529	Product Data, Show Drawings										
230593	Reports										
230713	Product Data, Shop Drawings, Installer Qualifications										
230900	Product Data, Shop Drawings, Diagrams,										
233113	Shop Drawings, Quals										
233423	Product Data, Shop Drawings, Certs, Operation & Maintenance Data, IOM										
233700	Product Data, Shop Drawings, AMCA Certification, Operation & Maintenance Data										
235100	Product Data, Shop Drawings, Welding Certificates, Warranty										
237413	Product Data, Shop Drawings, Commissioning Reports, Maintenance Data, Warranties										
237433	Product Data, Quals, Certs, Reports, Shop Drawings, Performance Data, Sound Power level data, Fan curves, Filter Data										
238239	Product Data, Shop Drawings, Operation & Maintenance Data										
260500	Test Reports, Shop Drawings, Operation & Maintenance Data, Coordination Drawings, Overcurrent Protection, Arc Flash Study										

260501	Product Data, Shop Drawings										
260519	Product Data, Shop Drawings										
260526	Product Data										
260533	Product Data										
260573	Coordination Study, Arc Flash Hazard Analysis										
262413	Product Data, Shop Drawings, Wiring Diagrams										
262416	Product Data, Shop Drawings, Warranty, Qualification Data, Field Quality-control Reports, Panelboard Schedules										
262550	Product Data, Warranty										
262726	Product Data										
262913	Product Data, Shop Drawings										
263213	Product Data, Spec. Compliance, Certs., Warranty, Shop Drawings, Wiring Diagrams,										
264100	Product Data, Shop Drawings										
265100	Product Data										
283111	Product Data, Shop Drawings, Qualification Data - Installer										
285500	Testing Data										
312000	Product Data										
321313	Product Data, Samples, Design Mixtures, Aggregates,										
321373	Product Data, Samples, Schedule, Certs, Reports,										
323113	Product Data, Shop Drawings, Samples, Delegated Design, Certs, Reports, Warranty										
329119	Product Data, Certs, Quals,										
333100	Product Data, Shop Drawings										
334100	Product Data, Shop Drawings										
334613	Product Data, Samples										

OPERATING INSTRUCTIONS AND SERVICE MANUAL LOG

Project: South Farm Swine Research & Education Facility – Construct Addition

Project Number: CP230851

Contractor:

Section	Description	Catalog Data	Wiring Diagrams	Installation Instructions	Service & Maintenance Instructions	Parts List & Availability	Performance Curves	Startup & Operating Instructions
066000	PVC Paneling				X			
074113	Formed Metal Roof Panels				X			
074219	Insulated Metal Wall Panels				X			
076200	Sheet Metal Flashing and Trim				X			
077100	Roof Specialties				X			
077200	Roof Accessories				X			
077253	Snow Guards				X			
081119	Hollow Metal Stainless Steel Doors and Frames				X			
081613	Fiberglass Doors				X			
083113	Access Doors and Frames				X			
087100	Door Hardware				X			
088000	Glazing				X			
096733	Trowel-Applied Resinous Flooring	X			X			
099600	High Performance Coating				X			
102800	Toilet and Bath Accessories				X			
104413	Fire Protection Cabinets				X			
123553	Stainless Steel Laboratory Casework	X			X			
210500	Product Data	X			X	X		X
211313	Product Data	X			X	X		X

211313	Approved Sprinkler Piping Drawing	X		X	X	X	X	
211313	Field Test Reports and Certificates	X						X
211313	Field Quality Control Test Reports	X			X			X
211313	Operation and Maintenance	X						X
220500	As-Built Drawings	X						
220500	Pipe Pressure Test Logs							
220529	Plumbing Hangers and Supports	X			X	X		X
220553	Plumbing Identification	X			X	X		X
220553	Equipment Label Schedule	X		X				
220553	Valve Numbering Scheme	X		X				
220719	Plumbing Piping Insulation	X		X				
221000	Plumbing Piping	X		X	X	X		X
221119	Plumbing Specialties	X			X	X		X
224000	Plumbing Fixtures	X	X	X	X	X		X
230500	Warranties	X						
230500	As-Built Drawings							
230500	Pipe Pressure Test Logs							
230519	Meters & Gages for HVAC Piping	X		X	X	X		X
230529	HVAC Hanger and Supports	X		X	X	X		
230553	HVAC Identification	X						
230713	Ductwork Insulation	X		X				
233300	Air Duct Accessories	X		X	X	X		X
233423	Power Ventilators	X	X	X	X	X	X	X
233700	Air Outlets & Inlets	X		X		X		
235100	Breeching, Chimneys, and Stacks	X		X	X	X		X
237413	Dedicated Outdoor Air System	X	X	X	X	X	X	X
237433	Packaged Rooftop Ventilators	X	X	X	X	X	X	X
238127	Variable Refrigerant Flow System	X	X	X	X	X	X	X

238239	Terminal Heat Transfer Units	X	X	X	X	X		X
260500	Common Work Results for Electrical				X			X
260519	Conductors	X						
260526	Grounding System	X			X			
260533	Raceways	X			X			
262413	Switchboards	X	X		X			X
262416	Panelboards	X	X		X			X
262726	Wiring Devices	X		X	X			
262913	Motor Controllers	X	X	X	X			X
263213	Generator Set	X	X	X	X	X		
265100	Lighting	X		X	X	X		
283111	Digital Addressable Fire Alarm System	X	X	X	X	X		

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CLOSEOUT LOG

Project: South Farm Swine Research & Education Facility – Construct Addition

Project Number: CP230851

Contractor:

Section	Description	Contractor/Subcontractor	Date Rec'd	# of Copies	CPM Initials	Remarks
GC /3.11	As-built drawings					
GC /13.5.6	Final Affidavit of Supplier Diversity Participation for each Diverse firm					
SC/20	Executed commissioning plan w/ required documentation					
	List special warranties and guarantees for each section					
	List any required maintenance stock, spare parts, etc.					
	List any special tools, keys, etc.					
066000	PVC Paneling Warranty					
055051	PVC Paneling Warranty					
071326	SELF-ADHERING SHEET WATERPROOFING Warranty					
074113.13	Formed Metal Roof Panels Maintenance Data Warranty					
074219	Insulated Metal Wall Panels Maintenance Data Warranty					
074239	Soffit Panels Maintenance Data					
076200	SHEET METAL FLASHING AND TRIM Maintenance Data					

077100	ROOF SPECIALTIES Maintenance Data Warranty					
077200	ROOF ACCESSORIES Maintenance Data Warranty					
079200	JOINT SEALANTS Mfgr Warranty Installer Warranty					
081119	STAINLESS STEEL FRAMES Warranty					
083113	ACCESS DOORS AND FRAMES Keys					
087100	DOOR HARDWARE Warranty Keys					
088000	GLAZING Warranty					
096733	TROWEL APPLIED RESINOUS FLOORING Maintenance Data					
099600	HIGH PERFORMANCE COATING Maintenance Data, Extra Materials					
102800	TOILET ACCESSORIES Warranty Keys					
104413	FIRE PROTECTION CABINETS Maintenance Data					
123553	STAINLESS STEEL LABORATORY CASEWORK Keys Extra Materials Touchup Kit					

211313	WET-PIPE SPRINKLER SYSTEMS Warranties, as-built drawings, piping, pressure test logs, closeout walk through documentation, owner training documentation					
220500	BASIC PLUMGING REQUIREMENTS Warranties, as-built drawings, piping pressure test logs, closeout walk through documentation, owner training documentation					
220519	PLUMING METERS AND GAUGES Project Record Documents					
221000	PLUMING PIPING Plumbing Piping Hydrostatic pressure test report, Provide two (2) repacking kits for each size valve					
221119	PLUMBING SPECIALTIES Project Record Documents					
224000	PLUMBING FIXTURES Project Record Documents					
230500	BASIC HVAC REQUIREMENTS Warranties, as-built drawings, piping pressure test logs, closeout walk through documentation, owner training documentation					
230519	HVAC METERS AND GAUGES Project record documents					
230593	TESTING ADJUSTING AND BALANCING Pre-balancing conference meeting notes, pre-balancing field deficiency report, TAB draft report, Final TAB Report					
233113	DUCTWORK Owner approval of ductwork cleaning, Damper re-setting demonstration to Owner					
233300	DUCTWORK ACCESSORIES Project Record Documents					
233423	POWER VENTILATORS Project Record Documents					

233700	AIR OUTLETS AND INLETS Project Record Documents Warranty					
235100	Breechings, Chimneys, and Stacks Project Record Documents					
237413	Dedicated Outdoor Air System Project Record Documents Warranty					
237433	Packaged Rooftop Ventilators Project Record Documents Warranty					
238127	Variable Refrigerant Flow System Project Record Documents Warranty					
238239	TERMINAL HEAT TRANSFER UNITS Project Record Documents Warranty					
260500	Common Work Results for Electrical Electrical Test Reports and Motor Test Reports, Record Documents					
260501	GENERAL ELECTRICAL PROVISIONS Extra materials Record Documents					
260533	RACEWAYS Record Documents					
262413	SWITCHBOARDS Record Documents, Warranty					
262416	PANELBOARDS Record Documents, Warranty					
262726	WIRING DEVICES Record Documents					

262913	MOTOR CONTROLLERS Record Documents					
263213	Generator Set Record Documents, Warranty					
265100	Lighting Extra material: Provide Ten (10) extra lamps per 100 for each installed; One (1) extra lens and louver per 100 for each installed; Provide one (1) extra ballast per 100 for each installed Record Documents					
265101	NETWORKED LIGHTING CONTROLS Record Documents, Warranty					
283111	ADDRESSABLE FIRE ALARM SYSTEM Record Documents, Extra Materials					

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Commissioning Plan

Swine Facilities - South Farms

Prepared for

University of Missouri

Prepared by

AccuTec

Services, Inc.
www.atsiusa.com

Report Date: 14Nov23

Project No.: 235513

Table of Contents

<u>Title</u>	<u>Section</u>
Commissioning Plan	1
Prerequisites, Tasks and Durations	A
Sample Pre-Functional Check Lists	B
Sample Functional Check Lists	C
Web-Based Commissioning Tools	D
Commissioning Schedule	E

Construction Phase Commissioning Plan

University of Missouri Swine Facilities – South Farms

1. Introduction
 - 1.1. This commissioning plan provides an overview of the commissioning process; outlines commissioning events and responsibilities and defines communication paths for this project. The commissioning process and individual responsibilities are detailed within the Appendices.
 - 1.2. This Commissioning Plan is a “living document,” meaning that it will become more detailed as it is updated and modified throughout the construction process. The plan provides a simplified schedule and key milestones of the commissioning events. Actual dates are added to the schedule as construction progresses.
2. Commissioning Overview
 - 2.1. Commissioning is a systematic process of verifying that all building systems perform interactively according to the design intent and the Owner’s operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with verification of installation and performance.
 - 2.2. Commissioning during the construction phase is intended to achieve the following specific objectives:
 - 2.2.1. Verify that applicable equipment and systems are installed according to the manufacturer’s recommendations and to industry accepted minimum standards and ensure they receive adequate operational checkout by installing contractors.
 - 2.2.2. Verify and document that the installed equipment and systems perform as intended by the Design Team in both summer and winter peak conditions.
 - 2.2.3. Verify that TAB is completed and meets the design specifications.
 - 2.2.4. Verify that the MEP O&M documentation left on site is complete.
 - 2.2.5. Verify that the Owner’s operating personnel are adequately trained.
 - 2.2.6. Verify that any observed concerns for MEP functionality are addressed by the Design and Construction Teams.
 - 2.3. Commissioning does not take away from or reduce the responsibility of the installing contractors to provide a finished and fully functioning product, nor does it replace the contractor’s quality assurance and quality control responsibilities. Commissioning is the Owner’s QA/QC and is not intended to be the Contractor’s QA/QC or project completion list.

3. Commissioning Team

3.1. Commissioning activities shall in general follow the requirements of the ASHRAE and NEBB Guidelines that focus on the mechanical, electrical, and life safety systems. This Commissioning effort includes the following participants:

3.1.1. Commissioning Team: The Mechanical, Electrical, and Control System subcontractors, as well as the construction manager, design team and Owner's team, have responsibilities associated with commissioning. These responsibilities are outlined in this plan and are detailed in the contract documents.

Owner: University of Missouri			
Project Manager		Phone Cell E-Mail	
Construction Manager		Phone Cell E-Mail	
Commissioning Authority (CxA): AccuTec Services, Inc.			
Project Manager:	Don Hill 320 NW Capital Drive Lee's Summit, MO 64086	Phone Cell E-Mail	(816) 525-8080 (816) 215-3966 dhill@atsiusa.com
Lead Architect: Clark & Enersen			
Mechanical/Plumbing Engineer: Clark & Enersen			
Mechanical Engineer:		Phone Cell E-Mail	
Electrical Engineer: Clark & Enersen			
Electrical Engineer:		Phone Cell E-Mail	
Construction Manager (CM):			
		Phone Cell E-Mail	

Mechanical Subcontractor (MC):			
		Phone Cell E-Mail	
Testing, Adjusting & Balancing Agency (TAB):			
		Phone Cell E-Mail	
Electrical Subcontractor (EC):			
		Phone Cell E-Mail	
Life Safety Subcontractor (LS):			
		Phone Cell E-Mail	
Building Automation System Subcontractor (BAS):			
		Phone Cell E-Mail	

4. Management, Reporting and Communication

- 4.1. The Commissioning Authority has been hired by the University of Missouri. The Commissioning Authority directs and coordinates the commissioning activities and reports to the Owner. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- 4.2. Commissioning related communication and reporting shall be channeled directly between the Commissioning Authority and the Contractor/Construction Manager. The Commissioning Authority will copy the Owner and AE on all commissioning related reports and communications.
- 4.3. Subcontractors will communicate, report, and issue commissioning related submittals directly to the Construction Manager.
- 4.4. The Commissioning Authority has no management authority over any contractors or their subcontractors. To enhance team communication, the Commissioning Authority will communicate directly with subcontractors when authorized by the Owner and Construction Manager.

5. Construction Phase Commissioning Activities

The Commissioning Authority is responsible for coordination of the entire commissioning

effort. The specific equipment and systems to be commissioned are identified in the equipment list at the end of this document. This equipment list represents major equipment within the systems to be commissioned; other associated components will be commissioned to provide a complete commissioning effort and report for the equipment/systems.

The following list describes the commissioning coordination activities for this project. Unless noted otherwise, these activities apply to all systems listed in section 6 of this commissioning plan. Further detail on prerequisites and durations of the commissioning activities for each discipline is included in the Appendices to this plan.

- 5.1. Commissioning Specifications: The Commissioning Authority will generate and issue specifications related to the commissioning process.
- 5.2. Design Review: The Commissioning Authority and the Owner will conduct a design review of the MEP drawings at the 95% design submittals. Comments will be provided to the AE through the University of Missouri. If necessary to resolve the design review comments, the Commissioning Authority will lead a design review meeting with the AE and Owner to address comments and concerns.
- 5.3. Scoping/Kick-Off Meeting: The Commissioning Authority will conduct a meeting to review the scope of commissioning with the commissioning team. The purpose is to further explain the role of each of the participants and assist in the overall coordination of the team as it relates to commissioning activities required by this plan and the project specifications.
- 5.4. Commissioning Duration Schedule: Based on the final commissioning plan prepare a duration schedule for the contractors for the commissioning activities required by the commissioning plan. This duration schedule should be incorporated into the contractor's project schedule to track all commissioning activities of the commissioning team.
- 5.5. Coordinate the Commissioning Effort: The Commissioning Authority will coordinate the commissioning activities, including: scheduling, testing, deficiency resolution, compliance with the contract documents, and information/document exchange with contractor, subcontractors, AE and Owner.
- 5.6. Finalize Commissioning Plan: The Commissioning Authority will finalize the commissioning plan based on the information exchanged at the scoping meeting.
- 5.7. Submittal Review: The Commissioning Authority will review the equipment submittals as they relate to commissioning and development of commissioning tests. The Commissioning Authority will not review the submittals for compliance with the contract documents. With the exception of critical path items, the Commissioning Authority shall only review equipment submittals following acceptance by the AE.
- 5.8. Submittal Tracking and Specification Testing Checklist: The Commissioning Authority will generate a list of the equipment submittals to be reviewed. This list will include field quality control tests required by the specifications.
- 5.9. Develop Construction Checklists (CC) / Pre-Functional Checks (PFC): The

Commissioning Authority will review submittals, including detailed start-up procedures and develop the detailed field installation checklists. The term Construction Checklist (CC) and Pre-Functional Checks (PFC) are interchangeable. These checklists will be used to verify and document proper and complete installation of the systems and their components.

- 5.10. Complete Construction Checklists: The Commissioning Authority will provide the contractors with the detailed Construction Checklists. The checklists are to be completed by the contractors and returned to Commissioning Authority for verification.
- 5.11. Review and Approve Start-up Plans: The Commissioning Authority will review and approve contractor submitted start-up plans in conjunction with the Owner. This includes review of temporary systems operational plans.
- 5.12. Site Visits: The commissioning team will visit the construction site during construction to field verify that the installation meets the requirements of the contract documents relating to commissioning items. Further, the Commissioning Authority will verify the information provided by the contractors in the Construction Checklists.
- 5.13. Develop the Functional Testing Procedures (FT): The Commissioning Authority will review the submittal documents and the early operations and maintenance (O&M) material and develop functional testing procedures. The terms Functional Testing (FT) and Functional Performance Testing (FPT) are interchangeable. The functional testing procedures will be reviewed with the design team and subcontractors as necessary to clarify operation.
- 5.14. Develop the Integrated Systems Testing Procedures (IST): The Commissioning Authority will review the submittal documents and the early operations and maintenance (O&M) material and develop Integrated Systems Testing procedures. The IST procedures will be reviewed with the design team and subcontractors as necessary to clarify operation.
- 5.15. Facilitate and Document Functional Performance Testing: The Commissioning Authority will observe and document the mechanical and electrical functional performance testing for the equipment listed in this plan.
- 5.16. Direct, Conduct, and Document Integrated Systems Testing: The Commissioning Authority will document the integrated systems testing as it relates to the mechanical, electrical, and fire/life safety systems included in the equipment list in this plan.
 - 5.16.1. Integrated system testing will include verification of the following:
 - 5.16.1.1. Shutdown of mechanical equipment on fire alarm.
 - 5.16.1.2. Generator NFPA (plugs out) testing
 - 5.16.1.3. UPS start-up and contractor's commissioning
- 5.17. Track Deficiency Resolution: The Commissioning Authority will document deficiencies and track the resolution of those deficiencies in a Commissioning Issue Log and will periodically issue the list to all parties. Where issues are

generated in the performance of Functional Performance Testing, each issue number will be referenced on the Functional Test document.

5.17.1. Retesting of deficient systems is not included in the Commissioning Authority's scope of work. The additional cost associated with troubleshooting and retesting of the commissioned systems will be charged to the Owner on a time and expense basis. For deficiencies due to lack of quality control/quality assurance, it is the Owner's intent to recover these costs from the contractor.

5.18. Review O&M Manuals for Commissioned Equipment: The Commissioning Authority will review the official submittal of the As-Built documentation and O&M manuals for accuracy, completeness, overall organization and ease of use with direction and input from the Owner.

5.19. Review Warranty: The Commissioning Authority will review the warranty documentation with direction and input from the Owner.

5.20. Deferred and/or Seasonal Testing: Testing during the construction phase that cannot be completed due to weather, occupancies, or deficiencies may be deferred to the acceptance phase. The Commissioning Authority will coordinate required deferred testing and update the commissioning report with results.

6. Systems/Equipment to be Commissioned

6.1. The following tables list the systems/items to be commissioned during the commissioning process.

Mechanical Systems

M.1	Rooftop Units (RTU)
M.2	Dedicated Outdoor Air Systems (DOAS)
M.3	Exhaust Systems
M.4	Heat Recovery System
M.5	Variable Refrigerant Flow Systems (VRF)

Direct Digital Controls/Building Automation Systems

BAS.1	Sensors
BAS.2	Actuators
BAS.3	Software
	Graphics Interface
	Occupied / Unoccupied Operations
	Alarms

Electrical Systems

E.1	Lighting Controls
E.2	Power Distribution
E.3	Emergency Power

7. Commissioning Report

- 7.1. The Commissioning Authority will develop and assemble a final report that documents all commissioning activities for the project. The final report will incorporate the final record documents for each system, as appropriate. The report will also include a summary of commissioning that will highlight the final condition of each system commissioned.

Construction Phase Commissioning Plan
University of Missouri
Swine Facilities – South Farms

APPENDIX A

1. Commissioning Prerequisites, Tasks and Durations

This document reflects the prerequisites, and tasks associated with the commissioning process. The prerequisites must be met prior to the corresponding commissioning activity taking place. The commissioning tasks are broken down per discipline and system. This appendix is a supplement to the commissioning plan.

2. General activities related to commissioning to be incorporated into the construction schedule:

2.1. Start-up plan and schedule: Contractor to submit plan (6 weeks prior to start-up), including, but not limited to:

- 2.1.1. The minimum load that is required to operate the heating and cooling plants
- 2.1.2. How to achieve that minimum load, including how many air handling units need to operate and at what conditions they are to operate
- 2.1.3. Airflow requirements
- 2.1.4. Minimum cooling coil air and water temperature difference
- 2.1.5. Heating and cooling coil requirements
- 2.1.6. Supply, return, and exhaust air paths
- 2.1.7. Minimum system and equipment safety requirements
- 2.1.8. Minimum maintenance requirements
- 2.1.9. The temporary sequences of operation for the heating and cooling plants and air handling units
- 2.1.10. Temporary TAB values and requirements for the air and hydronic systems

2.2. Review of Start-up Plan and Schedule

- 2.2.1. AccuTec and Owner review and comment on start-up plan (2 week duration)
- 2.2.2. Contractor to modify and resubmit start-up plan (1 week)
- 2.2.3. AccuTec and Owner review and comment on start-up plan (1 week)
- 2.2.4. Acceptance of final plan and schedule (2 weeks prior to start-up)

2.3. Electrical acceptance testing and submission of testing reports

2.4. Schedule Milestones

- 2.4.1. BAS installation completion, including programming and QA/QC
- 2.4.2. Contractor QA/QC completion for commissioned systems
- 2.4.3. TAB completion

3. Mechanical Commissioning Activities and Requirements

- 3.1. Documentation requirements precede commissioning activities. Properly executed and signed pre-functional checklists are required prior to AccuTec installation verification activities. Complete shop drawings, manufacturer's start-up reports and product data are required prior to functional performance testing (FPT/FT). Sub-items for the mechanical equipment noted are listed in chronological order.
- 3.2. Installation verification activities to be incorporated into the construction schedule for each piece of equipment and/or system include:
 - 3.2.1. AccuTec issues PFC (CC) Checklists to CM/GC
 - 3.2.2. Contractor directs and subs perform and document items on checklists.
 - 3.2.3. AccuTec monitors and reviews commissioning installation verification.
- 3.3. TAB verification activities to be incorporated into the construction schedule for each piece of equipment and/or system include:
 - 3.3.1. Receipt and approval of the TAB Preliminary Reports
- 3.4. The prerequisite for the functional performance testing is that all TAB verification for associated systems is complete; all aspects of the BAS system are complete including programming, loop tuning, graphics, and calibration. The intent is for the Contractors to have all associated equipment and systems configured in their final "turn over" state prior to testing of each system.

Functional performance testing activities to be incorporated into the construction schedule for each piece of equipment and/or system include:

 - 3.4.1. All TAB verification complete
 - 3.4.2. All BAS work complete
 - 3.4.3. All Non-Compliance items corrected
 - 3.4.4. AccuTec Commissioning Testing

4. Electrical Commissioning Activities and Requirements

- 4.1. Documentation requirements precede commissioning activities. Properly executed and signed PFC (CC) check sheets are required prior to AccuTec installation verification activities. Complete shop drawings (including short circuit and overcurrent protective device coordination study by Electrical Contractor), manufacturer's start-up reports, factory testing reports and product data are required prior to functional performance testing (FPT/FT).
- 4.2. Installation verification activities to be incorporated into the construction schedule for each piece of equipment and/or system include:
 - 4.2.1. AccuTec issues PFC (CC) Checklists to CM/GC
 - 4.2.2. Contractor directs and subs perform and document items on checklists.
 - 4.2.3. AccuTec monitors and reviews commissioning installation verification.
- 4.3. Acceptance Testing
 - 4.3.1. Acceptance testing of the electrical systems can commence as soon as the systems are installed and at the Electrical Contractor's discretion.
- 4.4. The prerequisite for the functional performance testing is that all acceptance

AccuTec Services, Inc.

testing is complete, reports approved, all manufacturers start-up is completed, and any major issues noted during PFC (CC) checklist verification have been resolved.

Functional performance testing activities to be incorporated into the construction schedule for each piece of equipment and/or system include:

- 4.4.1. Installation verified and major issues resolved
- 4.4.2. Start-up and QA/QC complete
- 4.4.3. AccuTec Commissioning Testing
- 4.4.4. On-site testing of the power distribution systems performed by installing contractor and manufacturer's representative per associated specification sections. Testing will be witnessed by AccuTec. The installing contractor shall prepare and submit associated test and inspection reports.

5. Integrated Systems Testing

- 5.1. Prior to integrated systems testing, the functional testing must be complete for all MEP systems and outstanding issues resolved. The intent is for the contractors to have all equipment and systems to be configured in their final "turn over" state prior to the IST. This includes all calibration, programming, timer settings, etc. Testing will include checking interactions between the building systems and a simulated power failure to verify proper building restart.

Construction Phase Commissioning Plan
University of Missouri
Swine Facilities – South Farms

APPENDIX B

Pre-Functional Check / Construction Checklist (PFC/CC) Sheets

The following documents reflect the depth of the Pre-Functional Check/Construction Checklist sheets which will be developed by the Commissioning Authority, executed by the contractor and subcontractors, and verified by the Commissioning Authority.

The Commissioning Authority will review the normal submittals, including detailed start-up procedures, and develop the detailed Pre Checklists. The final checklists will be provided to the contractors by the Commissioning Authority for completion by the contractors. The checklists are to be used to verify proper and complete installation of the required system and their components.

Pre-Functional Check Sheets

Will be generated and incorporated with subsequent Commissioning Plan revisions

Construction Phase Commissioning Plan
University of Missouri
Swine Facilities – South Farms

APPENDIX C

Functional Performance Tests / Functional Test Procedures (FPT/FT)

The following documents reflect the depth of the Functional Performance Testing/Functional Test Procedures to be performed during acceptance testing.

Test procedures will be developed by the Commissioning Authority and observed/executed by the Commissioning Authority with assistance from the contractors and subcontractors as noted in the Commissioning Plan, the Commissioning Specifications and Appendix A.

These tests will be developed for each piece of equipment, or system where appropriate, based on the final sequence of operation in the construction documents and using the approved Temperature Control submittals as an additional guideline. The Commissioning Authority will distribute the final tests to the contactors and design team prior to commissioning for review and comment.

Functional Performance Tests

Will be generated and incorporated with subsequent Commissioning Plan revisions

Construction Phase Commissioning Plan
University of Missouri
Swine Facilities – South Farms

APPENDIX D

Cloud-Based Commissioning Tools

AccuTec Services, Inc. implements the use of cloud-based commissioning tools provided by BuildingTest and powered by the SmartSynQ platform. The cloud-based tools allow all parties involved in the commissioning process to monitor project progress, track deficiencies, mitigate loss of field data, and maximize the efficiency of field technicians. Additional information regarding the BuildingTest tools can be found at www.BuildingTest.com while further information about the SmartSynQ platform is located at www.SmartSynQ.com.

Pre-Functional Checklists shall be completed by the installing contractor via the use of a remote handheld device. At least once a day, the information obtained by the contractor shall be uploaded from the handheld device to the project web-site. This upload can be performed via any wireless internet access point.

The remote handheld device must be one of the following types of devices:

- Windows 7 or later based PC with wireless connectivity
- Android based mobile device or tablet
- iOS based tablet

A central deficiency list will be maintained on the project website. This list may be accessed at any time in order to track outstanding issues that could result in project delays and to assure that all necessary items are completed prior to functional testing. A sample project may be viewed by logging on to AccuTec's project website using the following:

Commissioning Website: <https://live.buildingstart.com/accutec>

User Name: SF_Guest

Password: SF_Guest

The screenshots on the following pages have been provided to assist website visitors in the navigation required to view the various commissioning reports generated by BuildingTest.

The screenshot shows the AccuTec Building Start web application interface. The browser address bar displays the URL: <https://live.buildingstart.com/accutec//OfficeSuite/Projects/Project.aspx>. The page header includes the AccuTec Services, Inc. logo, the tagline "Providing Solutions for Critical Environments", and the BUILDING START logo with a user greeting "(Welcome, SF_Guest! Logout)". A navigation menu contains links for HOME, DEFICIENCIES, EQUIPMENT, REPORTS, FILE CLOUD, ANALYTICS, PROGRESS SUMMARY, TRAINING, and TOOLS.

The main content area is titled "Selected Project: 235513 - MU Swine Facilities South Farm" and indicates "You have 1 assigned projects". Below this is a project grid table with the following data:

Project Number	Project	Project Group	Status	
235513	MU Swine Facilities South Farm	Projects	Design Review	0 0 0/0 2 More Info.

The grid includes a "Refresh" button, a "Page size: 10" dropdown, and "1 items in 1 pages" information. Below the grid, there are controls for "Project Grid Tools" and "Apply Actions to Selected", including a "Set status..." dropdown and a "Set Status" button. A red arrow points to the "Set status..." dropdown.

At the bottom of the page, there is contact information: "For technical support or additional training, please call 888.524.7622 extension 2 or email support@buildingstart.com" and a link to the "Privacy Policy".

Step 1: Select *MU Swine Facilities National Swine*

Building Start - ACCUTEK - Building Comm X +

Private browsing

https://live.buildingstart.com/accutec//OfficeSuite/Projects/Checklist.aspx?projectid=b399f366-d2d4-4900-834f-746111c55878

AccuTec Services, Inc. Providing Solutions for Critical Environments BUILDING START (Welcome, SF_Guest! Logout)

HOME DEFICIENCIES EQUIPMENT **REPORTS** FILE CLOUD ANALYTICS PROGRESS SUMMARY TRAINING TOOLS

235513 - MU Swine Facilities South Farm View new reports
1 projects assigned

235513 - MU Swine Facilities South Farm Show Filters

Cx

Equipment 0%

Organize and view data using the options to the right. Click on a folder to add new items.

Refresh / Reload Data

Organize By

- Type
- Area
- Zone

Collapse Tree Object Options

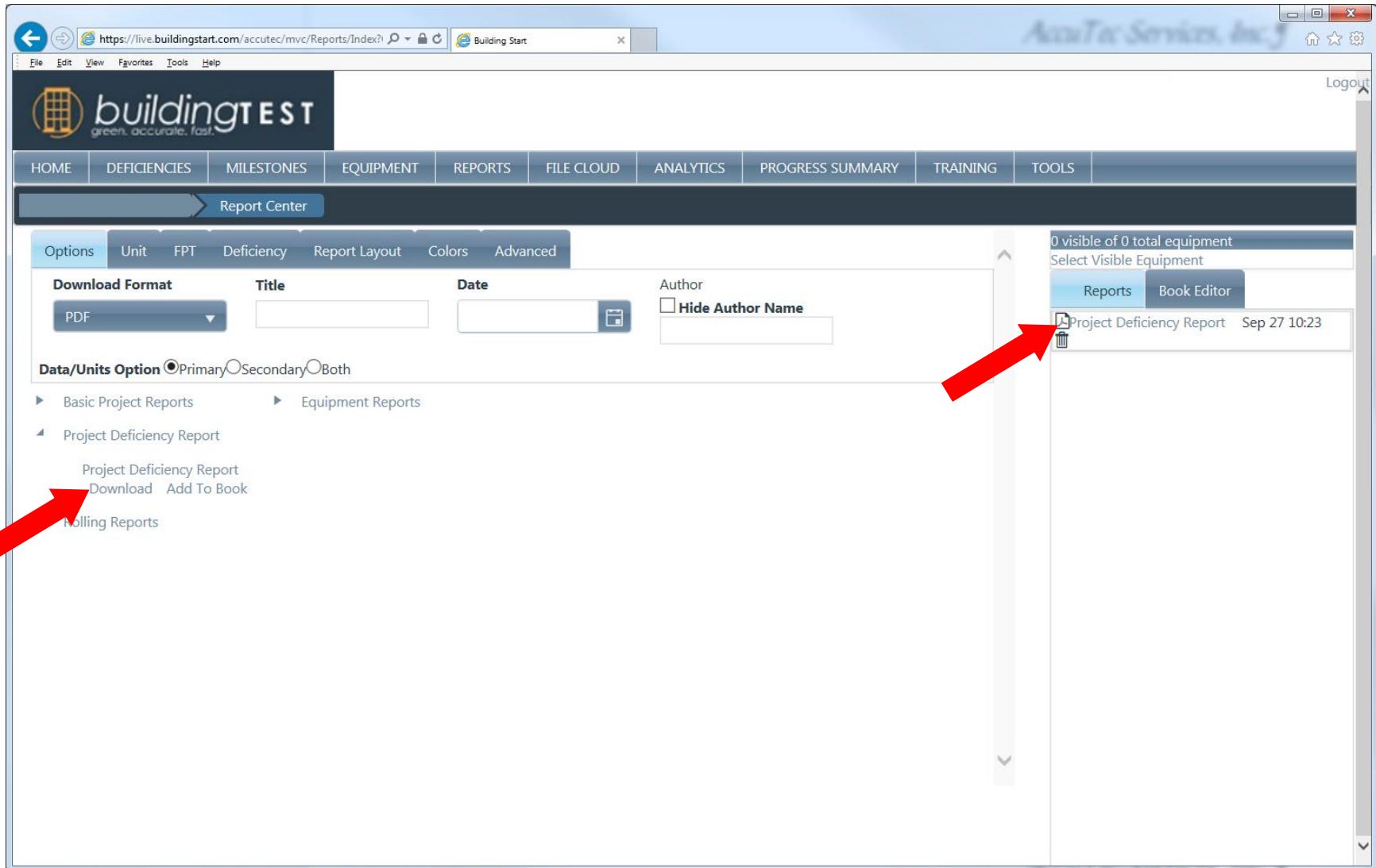
- Collapse Child Objects
- Hide Empty Objects
- Hide Empty Parent Objects
- Hide Completed Objects

Project Tools

For technical support or additional training, please call 888.524.7622 extension 2 or email support@buildingstart.com
[Privacy Policy](#)

javascript:openLinkWithProject('/accutec/mvc/Reports/Index?CompanyID=3231b96d-122b-dc11-87f1-00188b3cc6f1&projectID={{ProjectID}}', false, 0);

Step 2: Select "Reports" to view or download documents



Step 3: Select desired report for viewing or download

The screenshot shows the BuildingTEST web application interface. At the top, there is a navigation bar with tabs for ADMIN, HOME, DEFICIENCIES, MILESTONES, EQUIPMENT (selected), REPORTS, FILE CLOUD, ANALYTICS, and TOOLS. Below the navigation bar, the main content area displays "1 projects assigned" and a search filter. The central part of the interface is an equipment tree. The tree is expanded to show "Equipment 0%" and "(6) MECHANICAL HVAC SYSTEMS (view all) (add new)". Under this category, "AHU-001" is expanded to show its sub-items: "(1) AHU - Cabinet (add new)", "AHU-001/Cabinet", "(1) Coil - Chilled Water (add new)", "AHU-001/CC", "(1) Fan (add new)", and "AHU-001/SF". A red arrow points to the "AHU-001/Cabinet" item. Below the tree, there are more categories: "AHU-002", "AHU-003", "Auxiliary HVAC", "Exhaust Systems", "VAV Terminal Devices", "(2) MECHANICAL PIPING SYSTEMS (view all) (add new)", "Chilled Water System", and "Heating Hot Water System". On the right side of the interface, there is a sidebar with various options: "Organize and view data using the options to the right. Click on a folder to add new items.", "Refresh / Reload Data", "Add Project Level Deficiency", "Organize By" (with radio buttons for Type, Area, and Zone), "Collapse Tree Object Options" (with checkboxes for Collapse Child Objects and Hide Empty Objects), and "Project Tools" (with a list of tools like Link / Unlink Items, Data Exception Tool, Audit Verification Tool, Excel Export Tool, Project Bar Codes, View All Project FPTs, Assign Users, Edit Project, Copy Project, Edit Areas, Edit Zones, Set Active Parameters, and Set Project Parameters). At the bottom of the page, there is a footer with contact information: "For technical support or additional training, please call 888.524.7622 extension 2 or email support@buildingstart.com" and a "Privacy Policy" link.

Step 4: Use the equipment tree to navigate to specific equipment

Construction Phase Commissioning Plan
University of Missouri
Swine Facilities – South Farms

APPENDIX E

Commissioning Schedule

The following commissioning schedule is a “living document,” meaning it will become more detailed as it is updated and modified throughout the construction process. This schedule will be updated by the commissioning team regularly during construction to assist the scheduling of commissioning activities and required team attendance. The commissioning schedule will be updated based on the final construction documents.

The Commissioning Schedule

Will be generated and incorporated with subsequent Commissioning Plan revisions

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SECTION 1.F

INDEX OF DRAWINGS

Drawings referred to in and accompanying Project Manual consist of following sheets **December 7, 2023**.

General

Sheet 1 of 60: G0.00	Title Sheet & Drawing Index
Sheet 2 of 60: G0.01	General Notes, Symbols & Abbreviations
Sheet 3 of 60: G0.10	Code Compliance Plan
Sheet 4 of 60: G0.11	Code Compliance Plan
Sheet 5 of 60: G0.30	Construction Staging Plan

Civil

Sheet 6 of 60: C0.51	Site Erosion Control Plan
Sheet 7 of 60: C0.52	Site Erosion Control Details
Sheet 8 of 60: C1.01	Site Demolition Plan
Sheet 9 of 60: C2.01	Site Layout Plan
Sheet 10 of 60: C3.01	Site Grading Plan
Sheet 11 of 60: C4.01	Site Utility Plan
Sheet 12 of 60: C4.11	Site Utility Profiles
Sheet 13 of 60: C5.01	Site Details

Architectural

Sheet 14 of 60: A0.00	Wall Type Schedule & Details
Sheet 15 of 60: A0.11	First Floor Demolition Plan
Sheet 16 of 60: A1.10	Architectural Site Plan
Sheet 17 of 60: A1.11	First Floor Plan
Sheet 18 of 60: A1.12	First Floor Sloping Plan
Sheet 19 of 60: A1.13	Swine Penning Layout & Elevations
Sheet 20 of 60: A1.21	First Floor Reflected Ceiling Plan
Sheet 21 of 60: A1.30	Roof Plan
Sheet 22 of 60: A2.10	Exterior Elevations
Sheet 23 of 60: A3.10	Building Cross Sections
Sheet 24 of 60: A4.10	Wall Sections
Sheet 25 of 60: A6.10	Enlarged Plans, Elevations, Schedule & Details
Sheet 26 of 60: A6.40	Door Schedule, Door Types, Frame Types
Sheet 27 of 60: A8.10	Section Details

Interiors

Sheet 28 of 60: F1.10	First Floor Finishes Plan, Finish Schedule, Legend and Details
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Structural

Sheet 29 of 60: S0.00	General Notes
Sheet 30 of 60: S1.01	Foundation Plan
Sheet 31 of 60: S2.01	Roof Framing Plan
Sheet 32 of 60: S3.01	Typical Details
Sheet 33 of 60: S3.11	Foundation Sections

Sheet 34 of 60: S3.21 Roof Framing Sections

Fire Protection

Sheet 35 of 60: FS1.01 First Floor Fire Suppression Plans

Mechanical

Sheet 36 of 60: M0.00 Mechanical Abbreviations, Symbols & Notes
Sheet 37 of 60: M1.01 Below Floor Mechanical Plan
Sheet 38 of 60: M1.02 First Floor Plumbing Plan
Sheet 39 of 60: M1.03 First Floor HVAC Plan
Sheet 40 of 60: M2.01 First Floor Air Pressurization Plan
Sheet 41 of 60: M3.01 Plumbing Schematics
Sheet 42 of 60: M4.01 Mechanical Controls
Sheet 43 of 60: M4.02 Mechanical Controls
Sheet 44 of 60: M4.03 Mechanical Controls
Sheet 45 of 60: M4.04 Mechanical Controls
Sheet 46 of 60: M5.01 Mechanical Details
Sheet 47 of 60: M5.02 Mechanical Details
Sheet 48 of 60: M6.01 Mechanical Schedules
Sheet 49 of 60: M6.02 Mechanical Schedules

Electrical

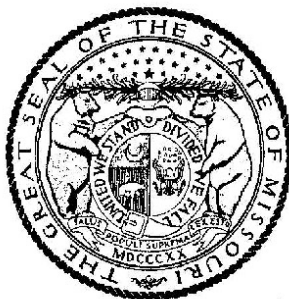
Sheet 50 of 60: E0.00 Electrical Abbreviations, Symbols Legend & General Notes
Sheet 51 of 60: E0.01 Electrical Site Utilities Plan
Sheet 52 of 60: E0.10 First Floor Electrical Demolition Plan
Sheet 53 of 60: E1.11 First Floor Lighting Plan
Sheet 54 of 60: E2.11 First Floor Power & Auxiliary Systems Plan
Sheet 55 of 60: E3.01 Electrical One Line Diagram – Base Bid
Sheet 56 of 60: E3.02 Electrical One Line Diagram – Add Alternate #4
Sheet 57 of 60: E4.01 Electrical Schedules
Sheet 58 of 60: E4.02 Electrical Schedules
Sheet 59 of 60: E5.01 Electrical Details
Sheet 60 of 60: E5.02 Electrical Details

END OF SECTION

SECTION 1.G

PREVAILING WAGE RATES

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION



MICHAEL L. PARSON, Governor

Annual Wage Order No. 30

Section 010
BOONE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by

Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: _____ **March 10, 2023**

Last Date Objections May Be Filed: **April 10, 2023**

Prepared by Missouri Department of Labor and Industrial Relations

Building Construction Rates for
BOONE County

Section 010

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	\$58.05
Boilermaker	\$73.87
Bricklayer	\$53.18
Carpenter	\$49.00
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	\$47.52
Plasterer	
Communications Technician	\$57.48
Electrician (Inside Wireman)	\$58.51
Electrician Outside Lineman	\$76.79
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	\$31.16*
Glazier	\$65.21
Ironworker	\$65.92
Laborer	\$42.86
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	\$31.16*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	\$64.73
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	\$40.26
Plumber	\$69.73
Pipe Fitter	
Roofer	\$53.14
Sheet Metal Worker	\$56.02
Sprinkler Fitter	\$61.21
Truck Driver	\$31.16*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMO Section 290.210.

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	\$53.37
Millwright	
Pile Driver	
Electrician (Outside Lineman)	\$76.79
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	\$46.32
General Laborer	
Skilled Laborer	
Operating Engineer	\$65.15
Group I	
Group II	
Group III	
Group IV	
Truck Driver	\$31.16*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

OVERTIME and HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, "**overtime work**" shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

END OF SECTION

SECTION 1.H

ALTERNATES

Base Bid may be increased in accordance with following Additive Alternate proposal(s) as Owner may elect:

1. Additive Alternate No. 1: **Swine penning**

Base Bid: Modular swine penning indicated as Base Bid in holding rooms 1029B, 1030B, 1031B, 1032B shall be provided. Perimeter penning and penning that shields floor drains shall be provided in base bid; dividing panels indicated as Alternate #1 shall not be provided in base bid. Pens shall be a modular system and attach to the CIP floor slab and CMU wall with expansion anchor bolted connections.

Add Alternate: Provide and install stainless steel modular swine penning as indicated in the contract documents as Alternate #1 in holding rooms 1029B, 1030B, 1031B, 1032B. Pens shall be a modular system and attach to the CIP floor slab and CMU wall with expansion anchor bolted connections.

2. Additive Alternate No. 2: **Surgery Lights**

Base Bid: Provide and install all structural support and rough-in electrical components for (2) surgery lights as shown on drawings. Surgery lights shall not be installed in base bid.

Add Alternate: Provide and install (2) surgery lights as specified.

3. Additive Alternate No. 3: **Composter pad, dumpster pad, and additional site work**

Base Bid: Concrete composter pad, dumpster pad, & sidewalk, as well as new gravel drive around composter area shall not be provided and installed in base bid. Provide and install all utility rough-in connections for equipment as indicated on drawings

Add Alternate: Provide and install concrete composter pad, dumpster pad, & sidewalk, as well as new gravel drive around composter area.

4. Additive Alternate No. 4: **Diesel Generator**

Base Bid: Provide and install all pullboxes and conduit necessary for the installation of a future diesel generator and associated standby automatic transfer switch. A pullbox shall be installed at the future location of the automatic transfer switch. All conduit necessary for the future diesel generator and automatic transfer switch shall be placed above and below grade with pull strings.

Add Alternate: Provide and install a new 250 kW diesel generator and generator docking station on a new concrete generator pad located on site, northwest of the building. A new automatic transfer switch shall be installed in the main electrical room along with necessary control wiring between the ATS and the generator. A generator annunciator panel shall be provided in "Open Office 1007" along with all necessary interconnection between annunciator panel and generator control panel. Provide site bollards around the generator per the contract documents.

END OF SECTION

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Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No. 624-223-23

**SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL AND SWPPP**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
1. Silt fence erosion protection.
 2. Hay bale silt fence erosion protection.
 3. Storm Water Pollution Prevention Plan (SWPPP) included in this project manual is part of the contract and Contractor is responsible for all items indicated therein.
- B. Related Sections:
1. Section 311000 – Site Clearing.
 2. Section 312000 – Earth Moving.
 3. Section 329119 – Landscape Grading.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements;
1. Comply with all requirements, exemptions, regulations and outflow sampling requirements set forth by local and state agencies.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Straw Bale Fence: As indicated on Drawings.
- B. Silt Fence Fabric: Synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yard, containing ultraviolet ray inhibitors and stabilizers providing a minimum of six months usable construction life at a temperature range from 0 to 120 degrees F., and meeting the following requirements:
1. Sediment retention efficiency: Not less than 85 percent.
 2. Grab strength at 20 percent maximum elongation:
 - a. Standard strength fabric: 30 pounds per lineal inch.
 - b. Extra strength fabric: 50 pounds per lineal inch.
 3. Flow rate: Not less than 0.30 gallons per square foot per minute.
- C. Silt Fence Posts: Contractor has option of the following:
1. 4 inch diameter pine.
 2. 2 inch diameter pine.
 3. 1.33 pound per lineal foot steel posts a minimum of 4 feet in length.
 - a. Steel posts shall have projections for fastening the fabric.

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No. 624-223-23

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion:
1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection:
1. Protect trees, shrubs, lawns, other vegetation and other features indicated on Drawings to remain, or not indicated to be removed.
 - a. Provide temporary guards to protect trees and vegetation which is to remain.
 - b. Protect roots over 1-1/2 inch diameter which are cut during construction operations.
 - 1) Coat cut faces with emulsified asphalt or other acceptable coating formulated for use on damaged plan tissues.
 - 2) Temporarily cover exposed roots with wet burlap to prevent roots from drying out. Cover with earth as soon as possible.
 2. Protect bench marks, monuments, existing structures, existing fences, existing roads, existing sidewalks, existing paving, existing curbs and other features indicated on Drawings to remain, or not indicated to be removed, from damage and displacement.
 - a. If damaged or displaced, notify Engineer and correct defects as directed by Engineer.
 3. Protect above and below grade utilities which are to remain.
- B. Preparation:
1. Use all means necessary to control dust on and near the Work, and on and near off-site storage, and spoil areas, if such dust is caused by performance of the Work of this Section, or if resulting from the condition in which Project Site is left by Contractor..
 2. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other Work on Project Site.

3.03 INSTALLATION

- A. Install erosion control devices at locations indicated on Drawings, and where required to protect adjacent and downstream properties from damage and pollution resulting from erosion caused by the Work of this Contract.
1. Implement erosion control measures indicated on Drawings and additional erosion control measures necessary to prevent damage to adjacent and downstream properties.
- B. Install silt fence located along perimeter of Site or grading limits immediately following site clearing operations specified under Section 311000.
1. Install silt fence fabric from a continuous roll for the length of the silt fence whenever possible to minimize the number of joints.

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No. 624-223-23

- a. Create joints in fabric by securely fastening fabric at the support post with overlap extending to the next post.
 2. Drive support post into ground not less than 18 inches.
 3. Excavate a 4 inch wide by 8 inch deep trench on up-slope side of silt fence.
 - a. Line trench with silt fence fabric materials.
 - b. Backfill trench with soil or gravel.
- C. Install straw bale fence at completion of grading operations in affected area.
1. Install erosion control devices at storm sewer inlets immediately after completion of the storm sewer.
 2. Place straw bales in a single row, lengthwise on the contour, and embedded 4 inches into soil.
 3. Secure each individual bale in place by stakes or reinforcement bars driven through bales into the ground to a depth not less than 18 inches.

3.04 MAINTENANCE

- A. Check silt fences and straw bale fences after each rainfall event to ensure that they are in proper working order:
1. Check embankments and spillways for erosion, settlement or other damage.
 2. Immediately make all necessary repairs.
- B. Inspect silt and straw bale fences at least once a week.
1. Immediately replace damaged portions of the silt fences, including portions which have collapsed, contain tears, have decomposed, or have become ineffective.
- C. Remove sediment deposits as necessary to provide adequate sediment storage and to maintain the integrity of fences.
- D. Maintain erosion control devices in places as specified until Site is stabilized by pavement, vegetation, or other means.
- E. After site is stabilized, remove erosion control devices, sediment, and debris from Site prior to final grading specified under Section 312000 and Section 329119.

3.05 SWPPP

- A. A Storm Water Pollution Prevention Plan (SWPPP), follows this section.
- B. The General Contractor shall be responsible for meeting the requirements of the SWPPP and the land disturbance plans.
- C. SWPPP Coordinator shall be the Contractor or someone hired by the Contractor.
- D. The Coordinator shall be responsible for the inspection and maintenance of the erosion control measures in accordance with the SWPPP.
- E. Contractor shall be responsible for employee training per the SWPPP.

University of Missouri
South Farm - Swine Research and Education Facility Addition
Columbia, MO

12/2023

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No. 624-223-23

END OF SECTION

University of Missouri - Columbia
South Farm – Swine Research and Education
Facility Addition
CP# 230851
Columbia, Missouri

NPDES Storm Water Pollution Prevention Plan for
Storm Water Discharges Associated with
Construction Activity

SK Design Group, Inc.

December 6, 2023

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1.0 Purpose of Plan

The purpose of this Construction Storm Water Pollution Prevention Plan (Plan) is to demonstrate compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) for General Permit MOR 100039 for storm water discharges associated with construction activity. The General Permit requires the preparation and implementation of such a plan to prevent, as much as practicable, the release of pollutants in storm water runoff from the construction site to waters of the United States.

This Plan provides information about the University of Missouri CP #230851 project located in Columbia, Missouri. Administrative requirements and potential storm water and non-storm water pollutant sources are identified. Best management practices to prevent the discharge of non-storm water materials in storm water runoff are also described.

The University of Missouri CP #230851 project site consists of approximately 5 acres of land located northeast of the intersection of University Lane and the future extension of Discovery Ridge. The future extension of Discovery Ridge is approximately 300' north of E Sugar Grove Road at the location of the site. The site is in Columbia, Missouri. This SWPPP addresses construction of the Swine Research Facility with site/utility improvements and disturbs approximately 2.5. A project location map is attached as Exhibit 1.

Site Evaluation

2.0 Project Information

Project Name and Location: CP #230851, Columbia, Missouri

MU Designated Representatives for Environmental Issues: Michael Stornello

Owner Name: University of Missouri Columbia

General Project Description: Construction of the South Farm Swine Research and Education Facility addition with site/utility improvements at the northeast corner of the intersection of University Lane and Discovery Ridge Parkway.

Project Location: Northeast of the intersection of University Lane and Discovery Ridge Parkway. Refer to Exhibit 1.

General Construction Activity Description: Grading, building construction, underground utility construction, drive and sidewalk construction.

2.1 Topography and Drainage

The topography of the existing property slopes from the west to the east of the site. There is approximately 4-6 feet of vertical relief between the west and east side of the site.

2.2 Soils

The soils on this project site were identified according to the Geotechnical Engineering Report for CP #230851. The soil in the area consists of a combination of silty clay and silty clay with sand and gravel.

2.3 Runoff Water Quality

No surface water quality data is available for the project site. However, due to the nature of the site runoff could be expected to contain some suspended solids.

2.4 Receiving Waters

The site is collected by a concrete flume on site and flows above ground to an unnamed tributary along the east side of the property. The unnamed tributary drains to the northeast, 0.52 miles to Grindstone Creek. See attached map of tributary in appendix A.

Section 404 Permit and associated 401 Water Quality Certification were considered but they are not applicable.

2.5 Buffer Exceptions

No natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for this project.

3.0 Site Construction Plan

The following sections describe the proposed development and the site construction plan.

3.1 Construction Activities

The project site will include construction of the South Farm Swine Research and Education Facility addition with gravel drive, sidewalk and utility improvements. The project will require pavement/utility demolition, soil removal, and site grading to support the planned development. Soil disturbing activities will include clearing, grubbing, and pavement/utility demolition. The project will have construction access off the existing gravel driveway around the Phase 1 building. The project construction traffic will utilize University Lane on the west side of the site. The contractor shall be responsible for minimizing soils tracked onto the surrounding roadway and their cleaning.

A record of the project site construction activities must be maintained as a part of this Plan. Appendix A includes a form and instructions to record such information on an ongoing basis.

3.2 Construction Sequence

The project will be constructed generally following the sequence indicated below.

Site Best Management Practices will be installed.

The site will be cleared and grubbed.

The site utilities and pavements will be constructed.

Remove BMP's after site is stabilized.

4.0 Storm Water Management Plan

This storm water management plan was designed following EPA guidelines. Structural sediment control devices will be the main means of storm water management. Storm water sediment controls will be installed before any construction begins.

The proposed construction activities do not impact any Waters of the US and Section 404 Permit and associated Section 40 Water Quality Certifications are not required for the project.

4.1 General Description of Storm Water Management System

The potential for storm water runoff pollution will be present during construction of the site. This risk will be minimized through the use of several control measures implemented before and during the construction sequence.

The storm water management system was designed in accordance with the EPA's guidance document entitled *Storm Water Management for Construction Activities- Developing Pollution Prevention Plans And Best Management Practices* (EPA 832-R-92-005, September 1992). Structural measures are the main means of storm water management. Storm water control measures are described and shown on the Erosion Control Plan Drawing. This document is available at the USEPA internet site; and

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and storm water best management practices for development sites in Missouri*, published by the Missouri Department of Natural Resources. This manual is available on the department's internet site at: <http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm>.

It will be the responsibility of the Construction Manager to revise the Erosion Control Plan Drawing if the location or types of control measures are changed in the field.

4.2 Runoff Coefficient

In determining the runoff coefficient for the project site the method described City of Columbia's Stormwater Management & Water Quality Manual. This method is based on the pavement areas and vegetative cover of both the existing and proposed conditions.

4.3 Project Site

The surface water management during construction will be through the use of silt fences, inlet protection and soil stabilization measures. Storm water will be conveyed by overland surface flow to silt fences or inlet protection. The silt fences or inlet protection will remove suspended solids before entering the public storm system.

4.3.1 Stabilization Practices

Temporary and permanent stabilization methods will be used on the project site. Two major stabilization methods that will be used on the site are preserving existing vegetation where possible and disturbing only the area needed for project construction. Disturbed portions of the site will be stabilized within 7 days after construction activity has temporarily or permanently ceased, with two exceptions –when snow cover precludes construction or construction will resume within 21 days. Stabilization practices may include temporary or permanent seeding,

mulching, geotextiles, sodding, or aggregate surfacing. Site access facilities (entrances/exits and parking areas) will be surfaced with aggregate to reduce sediment tracking.

4.3.2 Structural Practices

Temporary devices to divert, store, or limit runoff from disturbed areas will be used on the project site. Such devices may include silt fences, triangular silt dike and catch basin inlet protection. Details of the control measures are shown on the site plan, erosion control plans, and detail sheets (Appendix D)

Wash and/or rinse waters from concrete mixing equipment including ready mix concrete tracks shall be collected in a concrete washout with vehicle tracking control as shown on standard detail “ESC-01 construction entrance and concrete washout”. Material from the concrete washout shall be removed and properly disposed of off site. The concrete washout shall remain in place until all concrete for the project is placed.

Any dewatering required for construction shall be pumped to a straw bale/sediment fence pit for filtering, see standard drawing “ESC-41 straw bale/sediment fence pit” detail in Appendix D. Once the wet storage area becomes filled to half of the excavated depth, accumulated sediment shall be removed and properly disposed of.

5.0 Potential Storm Water Pollutant Sources and Control Measures

Pollutants from various sources have the potential to enter the storm water system during project construction. A description of these potential pollutants and control measures to reduce the risk of storm water contamination is provided below.

5.1 Construction Silt and Dust

The pre-developed site is collected by a drainage system on site and flows above ground and through a pipe system to the northeast into un-named tributaries, 0.52 miles from Grindstone Creek. Construction of the project will generate silt and fugitive dust.

Silt barriers (fences/dikes) will be installed along perpendicular to the storm runoff on all disturbed slopes as shown on the Erosion Control Plan to control offsite discharges of silt. The silt barrier will be installed after the clearing and grubbing necessary for placement of the silt barrier is complete, but before the clearing and grubbing of the remaining work area is started. The silt barrier will remain in place until the up slope surface is permanently stabilized. If construction in a particular area will cease temporarily, temporary soil stabilization will be implemented no more than 7 days after the construction has ceased unless activity will resume in that area within 21 days. Permanent stabilization will take place no later than 7 days after construction activities have permanently ceased in an area.

Fugitive dust may be generated during dry weather conditions. Dust control will be directed by the construction manager. Water sprays will be used for dust control.

5.2 Offsite Sediment Tracking

Contractor is responsible for keeping all public roadways adjacent to the construction site free of dirt and debris resulting from activities related to the construction of this project. The site access drive will be aggregate construction and maintained to reduce tracking of sediment offsite.

5.3 Petroleum Products

Construction equipment will require diesel fuel and oil on a regular basis, so the potential exists for spills or leaks. All onsite vehicles will be monitored for leaks and receive regular preventative maintenance to ensure proper operation and reduce the chance of leaks. No “topping off” of fuel tanks will be allowed to reduce the possibility of spills.

Petroleum products will be stored in clearly labeled and tightly sealed containers or tanks. Any asphalt used onsite will be applied according to the manufacturer’s recommendations. Any soil Contaminated by fuel or oil spills will be removed and disposed of at an approved disposal site by MU Environmental Health & Safety. The contractor shall not remove or dispose contaminated soils.

5.4 Sanitary Wastes

A licensed sanitary waste management contractor will collect all construction or temporary sanitary wastes from portable units. The units will be maintained on a regular basis.

5.5 Hazardous Wastes

MU Environmental Health & Safety will remove and dispose of any hazardous waste according to local or state regulation or the manufacturer’s recommendations. The contractor shall not remove or dispose any hazardous waste materials. The Construction Manager who will also be responsible for their implementation will instruct site personnel of these regulations and recommendations.

5.6 Fertilizers

Fertilizers will be applied as recommended by the manufacturer. After application the fertilizer will be worked into the soil to limit exposure to storm waters. Fertilizers will be stored in a covered area or in watertight containers. Any partially used bags or containers will be properly sealed and stored to avoid spills or leaks.

5.7 Paints

All paint containers will be tightly sealed and properly stored to prevent leaks or spills. Paint will not be discharged to the storm water system. MU Environmental & Health Safety will remove and dispose of any unused paints according to local and/or state regulations. The contractor shall not remove or dispose any unused paints. Spray painting will not occur on windy days and a drop cloth will be used to collect and dispose of drips and over-spray associated with all painting activities.

5.8 Concrete Trucks

Concrete trucks will be allowed to discharge surplus concrete or drum wash water on the site in such a manner that prevents contact with storm waters discharging from the site. Dikes or barriers will be constructed around such an area to contain these materials until stable, at which time the materials will be disposed of in a manner acceptable to the Construction Manager and the construction site inspector.

5.9 Waste Materials

All construction waste material will be collected, deposited and stored in metal dumpsters from a licensed solid waste management contractor. No construction waste materials will be buried onsite. Burning of waste construction materials on site is not allowed. For burning allowances, see the MU Burn Permit in Appendix A. The MU Burn Permit must be filled out and submitted to MU-EHS for approval prior to any burning on site. All site personnel will be instructed of the proper waste disposal procedures by the Construction Manager.

5.10 Allowable Non-Storm Water Discharges

The following sources of non-storm water discharges from project construction activities may be combined with storm water discharges.

- Washing vehicles is only allowed if no cleaning agents are used. Sediment must settle before reaching the storm drain.
- Waters used to control dust
- Pavement wash waters not containing toxic or hazardous substances
- Uncontaminated dewatering discharges
- Fire fighting waters
- Vegetation watering
- Potable or spring water discharges

6.0 Best Management Practices

Chemicals, petroleum products and other materials will be used and stored on the project site. Best Management Practices, such as good housekeeping measures, inspections, containment, and spill prevention practices will be used to limit contact between storm water and potential pollutants.

6.1 Good Housekeeping

The good housekeeping practices listed below will be followed to reduce the risk of potential pollutants entering storm water discharges. All construction personnel will be responsible for monitoring and maintaining housekeeping tasks or notifying the appropriate person of a problem.

- Store only enough products to do the job.
- Store all materials in a neat and orderly manner, in the appropriate containers and, if possible, under a roof or within an enclosure
- Keep products in the original container with original manufacturer's label.
- Do not mix products unless recommended by the manufacturer
- Use all of a product before disposing of the container.

- Use and dispose of products according to the manufacture's recommendations or the Construction Manager's direction.
- Perform regular inspections of the storm water system and the material storage areas.
- When and where appropriate, use posters, bulletin boards, meetings, etc. to remind and inform construction personnel of required procedures.

6.2 Hazardous Materials

Storage areas for hazardous materials such as oils, greases, paints, fuels, and chemicals must be provided with secondary containment to ensure that spills in these areas do not reach waters of the State. MU-EHS must be contacted in the event any soil becomes contaminated. MU-EHS will dispose of any contaminated soil. The contractor shall not dispose of any contaminated soil without consulting MU-EHS.

6.3 Spill Prevention and Response

In addition to the good housekeeping and hazardous materials storage procedures described above, spill prevention and cleanup practices will be as follows.

- Construction personnel will be informed of the manufacturer's recommended spill cleanup methods and the location of that information and clean up supplies.
- Materials and equipment for the cleanup of a relatively small spill will be kept in the materials storage area. These facilities may include brooms, rags, gloves, shovels, goggles, sand, sawdust, plastic or metal trash containers, and protective clothing.
- All containers will be labeled, tightly sealed, and stacked or stored neatly and securely.

The spill response procedure will be as follows:

Step 1. Upon discovery of a spill, stop the source of the spill.

Step 2. Cease all spill material transfer until the release is stopped and waste removed from the spill site.

Step 3. Initiate containment to prevent spill from reaching State waters.

Step 4. Notify a Supervisor or the Construction Manager of the spill.

Step 5. The Construction Manager will coordinate further cleanup activities

Step 6. In case of significant spill of hazardous material, the Construction Manager should call 911 in case of immediate danger to life or health and MU EHS, but MU EHS will decide if a reportable spill has occurred and will make the appropriate notifications to other agencies as necessary.

Step 7. Review the construction storm water pollution prevention plan and amend if needed. Step

8. Record a description of the spill, cause, and cleanup measures taken.

7.0 Inspection, Maintenance, and Reporting Procedures

Site inspection and facility maintenance are important features of an effective storm water management system. Qualified personnel will inspect disturbed areas of the site not finally stabilized, storage areas exposed to precipitation, all control measures, and site access areas to determine if the control measures and storm water management system are effective in preventing significant impacts to receiving waters.

7.1 Erosion and Sediment Controls

The following procedures will be used to maintain erosion and sedimentation controls.

- The contractor in conjunction with the MU inspector shall perform inspections of erosion and sediment control measures at least once per seven calendar days. If a rainfall causes stormwater runoff to occur onsite, the BMPs must be inspected. These inspections must occur within 48 hours after the rain event has ceased during a normal work day and within 72 hours on the next business day if the rain event ceases during a non-work day such as a weekend or holiday.
- The contractor is responsible for providing erosion and sediment control BMPs to prevent sediment from reaching paved areas, storm sewer systems, drainage courses and adjacent properties. In the event the prevention measures are not effective, the contractor shall remove any debris, silt or mud and restore the right of way, or adjacent properties to original or better condition.
- The contractor shall seed, mulch or otherwise stabilize where soil disturbing activities will cease on any portion of the site and are not planned to resume for a period exceeding 14 calendar days. Temporary stabilization must be initiated immediately upon knowing the duration is more than 14 days. Temporary stabilization must be completed within 7 calendar days.
- The contractor is responsible for providing erosion and sediment control for the duration of the project.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts and healthy growth.
- Inspect riprap and aggregate covered areas for bare spots and washouts.
- The Construction Manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated individuals will receive necessary training from the Construction Manager to properly inspect and maintain the controls in good working order.
- Inspection Form 1 will be completed after each inspection.

7.2 Non-Storm Water Controls

The following procedures will be used to maintain the non-storm water controls.

All control measures will be inspected at least once a week and after each runoff producing rainfall event and daily during prolonged rainfall periods.

All control measures will be maintained in good working order. If a repair is necessary, it will be initiated and repaired within 24 hours of the inspection.

The Construction Manager will select individuals to be responsible for inspections, maintenance, repairs, and reporting. The designated individuals will receive the necessary training from the Construction Manager to properly inspect and maintain the controls in good working order.

Inspection Form 2 will be completed after each inspection.

The completed Inspection Forms will be kept with this Plan in Appendix B.

7.3 Reporting

Two inspection forms are provided on the following pages for recording inspections and maintenance of the control measures: Erosion and Sedimentation Controls (Inspection Form 1), and Non-Storm Water Source Controls (Inspection Form 2). All disturbed areas and materials storage areas require inspection at least once per seven calendar days. If a rainfall causes stormwater runoff to occur onsite, the BMPs must be inspected. These inspections must occur within 24 hours after the rain event has ceased during a normal work day and within 48 hours on the next business day if the rain event ceases during a no-work day such as a weekend or holiday. After each inspection, the inspector completes an inspection report and inserts that report in Appendix B of this Plan. Any required maintenance is initiated within 24 hours of the inspection.

A fully signed copy of this Plan and any support materials must be maintained at the project site from the date of the project initiation to the date of final stabilization. All records and supporting documents will be compiled in an orderly manner and maintained for a period of three years following final stabilization.

The generation of reports, as part of the construction process and inspection or amendment procedures, provides accurate records that can be used to evaluate the effectiveness of this Plan and document the plans compliance. Changes in design or construction of the storm water management system are documented and included with the Plan to facilitate Plan review or evaluation. Four forms have been developed to assist the Construction Manager with record keeping activities.

- Record of Plan Amendments
- Construction Activity Record
- Erosion and Sedimentation Controls Inspection Form 1
- Non-Storm Water Source Controls Inspection Form 2

Plan amendments will be documented on the form in the front of this Plan and on the drawings. A record of construction activities will be maintained in Appendix A of this Plan. Completed inspection and maintenance forms will be kept in Appendix B of this Plan.

Inspection Form 1

Erosion and Sedimentation Controls

Visually inspect disturbed areas of the construction site that have not been finally stabilized. Inspections to be completed every 7 days and within 24 hours of a rainfall event of ½ inch or more. Maintenance to be preformed within 24 hours of inspection.

Inspector: _____

Inspection Date: _____

Date of last rainfall: _____

Amount of last rainfall: _____ inches

Report on the condition of the erosion and sedimentation controls installed at the construction site. Check for tears in silt barriers, for securely attached fabric to fence posts, and for depth of sediment in front of the silt barriers. The depth of sediment should not exceed one-half of the barrier height. Seeding/planting areas and rip-rap aggregate areas should be inspected for bare spots and washouts.

Area	Condition of Control	Maintenance Required/Completion Date

Inspection Form 2

Non-Storm Water Source Controls

Visually inspect material storage and construction areas. Inspections to be completed every 7 days and within 24 hours of a rainfall event of ½ inch or more. Maintenance to be performed within 24 hours of inspection.

Inspector: _____

Inspection Date: _____

Date of last rainfall: _____

Amount of last rainfall: _____ inches

Construction Dust- Is there excessive dust at the site that requires watering?

Sediment Tracking – Is Street mostly free from mud, dirt, or rock?

Is wash down required? _____

Are graveled areas adequately covered? _____

Petroleum/Chemical Products – Are spill containment structures secure? Product containers securely sealed? _____

Sanitary Waste – Do portable sanitary units need service? _____

Hazardous waste – Are hazardous wastes stored and disposed of in compliance with state and local regulations? _____

Inspection Form 2
Non-Storm Water Source Controls
(Continued)

Construction Waste – Are all construction waste materials collected and stored in approved dumpsters? _____

Material Storage Areas Exposed to precipitation – Are materials handled and stored in a manner to prevent leakage and prevent pollutants from entering the storm water system?

Other Non-Storm Water Discharges – Are waters from line flushing, pavement wash down, and dewatering directed to the storm water system prior to discharge?

Maintenance Required

Maintenance Completed Date

8.0 Certification of Compliance

This Construction Storm Water Pollution Prevention Plan reflects best management practices and erosion and sedimentation control measures for storm water management as practices and erosion and sedimentation control measures for storm water management as recommended by the Environmental Protection Agency.

8.1 Contractor Certifications

The Contractor Certification forms provided in this section indicate that each contractor or subcontractor working on the project site understands the terms, conditions, and intent of the NPDES General Permit for Construction Storm Water Discharges Associated with Construction Activity and will implement the measures described in this Plan appropriate to his area of work.

If additional sheets are needed due to more subcontractors on site than sheets provided herein, additional sheets may be copied and inserted into booklet at the job site.

9.0 Project Completion

Construction is considered complete when the project is 70% of fully established plant density over 100% of the disturbed area. The Construction Manager may terminate construction erosion and sediment control measures at this time. MU Construction Management will submit a Request for Closure to MU EHS to make the final determination to close the site disturbance permit.

Permanent storm water control measures incorporated into the project site design include vegetated swales, aggregate surfacing of facility areas, culvert inlet/outlet protection and a storm water retention basin.

10.0 References

The references used to develop this plan and provide further details on items mentioned in this plan are as follows:

- 1) *Storm Water Management for Construction Activities- Developing Pollution Prevention Plans And Best Management Practices* (EPA 832-R-92-005, September 1992)
- 2) *Protecting Water Quality: A field guide to erosion, sediment and storm water best management practices for development sites in Missouri*, published by the Missouri Department of Natural Resources. This manual is available on the department's internet site at: <http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm>.
- 3) SECTION 015713 – TEMPORARY EROSION AND SEDIMENT CONTROL AND SWPPP. Available in the set of specifications in the project package.
- 4) Drawing Sheet C0.51, Erosion Control Plan and C0.52, Erosion Control Details. Available in the drawing set in the project package.
- 5) Drawing Sheet C3.01, SITE GRADING PLAN. Available in the drawing set in the project package.

Appendix A

Location Map
USGS Map



4600 College Boulevard,
 Suite 100
 Overland Park, Kansas 66211
 Tel: 913-451-1818
 Fax: 913-451-7599

LOCATION MAP

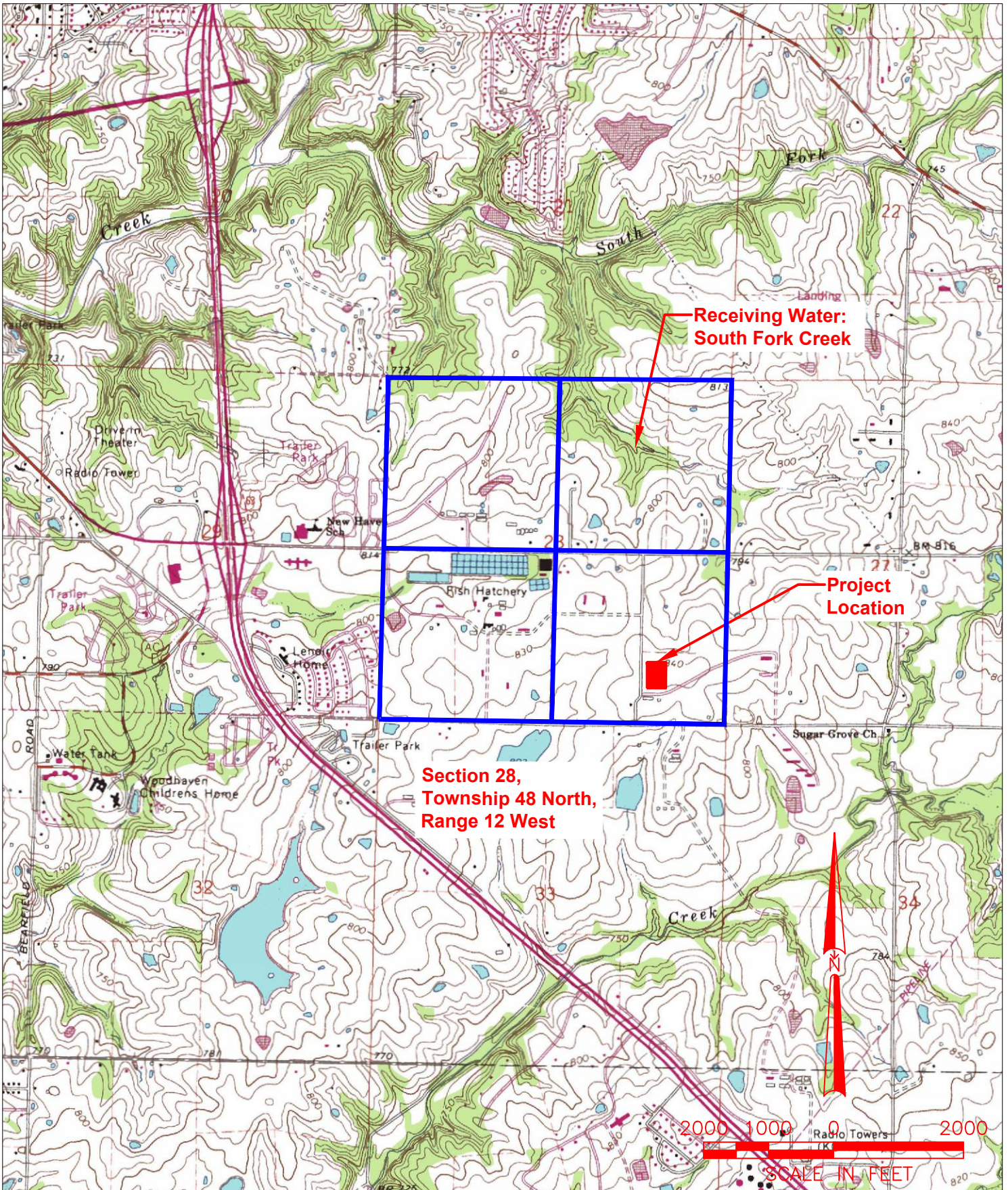
CP230851

University of Missouri Swine Research and Education Facility Addition
 South Farm Columbia, MO 65201

Appendix A
 EXHIBIT

1

October 2023



4600 College Boulevard,
Suite 100
Overland Park, Kansas 66211
Tel: 913-451-1818
Fax: 913-451-7599

USGS MAP

CP230851

University of Missouri Swine Research and Education Facility Addition
South Farm Columbia, MO 65201

Appendix A
EXHIBIT

2

October 2023

Appendix B
USDA Soil Report



4600 College Boulevard,
 Suite 100
 Overland Park, Kansas 66211
 Tel: 913-451-1818
 Fax: 913-451-7599

SOIL MAP

CP230851

University of Missouri Swine Research and Education Facility Addition
 South Farm Columbia, MO 65201

Appendix A
 EXHIBIT

3

October 2023

Custom Soil Resource Report for **Boone County, Missouri**



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

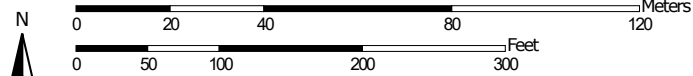
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Map Scale: 1:1,610 if printed on A portrait (8.5" x 11") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boone County, Missouri
 Survey Area Data: Version 26, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
50001	Armstrong loam, 5 to 9 percent slopes, eroded	1.9	13.9%
50059	Mexico silt loam, 1 to 4 percent slopes, eroded	11.7	86.1%
60022	Leonard silt loam, 1 to 6 percent slopes, eroded	0.0	0.0%
Totals for Area of Interest		13.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

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landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boone County, Missouri

50001—Armstrong loam, 5 to 9 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2x425
Elevation: 560 to 920 feet
Mean annual precipitation: 37 to 45 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Armstrong and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Armstrong

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over red paleosol and underlying subglacial till

Typical profile

Ap - 0 to 8 inches: loam
BE - 8 to 11 inches: loam
Bt1 - 11 to 14 inches: clay loam
2Bt2 - 14 to 18 inches: clay loam
2Bt3 - 18 to 26 inches: clay
2Bt4 - 26 to 54 inches: clay loam
2C - 54 to 79 inches: clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr)
Depth to water table: About 12 to 16 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R109XY046MO - Till Upland Savanna
Hydric soil rating: No

Minor Components

Leonard

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R113XY002MO - Loess Upland Prairie
Hydric soil rating: Yes

Lindley

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY009MO - Till Protected Backslope Forest, F109XY022MO
- Till Exposed Backslope Woodland
Hydric soil rating: No

Keswick

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F109XY007MO - Till Upland Woodland
Hydric soil rating: No

50059—Mexico silt loam, 1 to 4 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2wvc5
Elevation: 570 to 920 feet
Mean annual precipitation: 37 to 41 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 189 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Mexico and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mexico

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess over pedisediment

Typical profile

Ap - 0 to 7 inches: silt loam
Btg1 - 7 to 15 inches: silt loam
Btg2 - 15 to 34 inches: clay
Btg3 - 34 to 42 inches: silty clay loam
2Btg4 - 42 to 79 inches: silty clay loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R113XY001MO - Claypan Summit Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: Yes

Minor Components

Armstrong

Percent of map unit: 7 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY006MO - Till Upland Prairie
Hydric soil rating: No

Putnam

Percent of map unit: 5 percent
Landform: Divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear

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Ecological site: R113XY001MO - Claypan Summit Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: Yes

Leonard

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R113XY002MO - Loess Upland Prairie
Hydric soil rating: Yes

60022—Leonard silt loam, 1 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2x41x
Elevation: 570 to 980 feet
Mean annual precipitation: 35 to 43 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 190 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Leonard and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leonard

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess over till

Typical profile

Ap - 0 to 8 inches: silt loam
2Btg1 - 8 to 26 inches: silty clay
2Btg2 - 26 to 79 inches: silty clay loam

Properties and qualities

Slope: 1 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches

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Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water capacity: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

Ecological site: R113XY002MO - Loess Upland Prairie

Hydric soil rating: Yes

Minor Components

Armstrong

Percent of map unit: 7 percent

Landform: Interfluves

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: R109XY006MO - Till Upland Prairie

Hydric soil rating: No

Mexico

Percent of map unit: 5 percent

Landform: Ridges

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: R113XY001MO - Claypan Summit Prairie

Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)

Hydric soil rating: Yes

Keswick

Percent of map unit: 3 percent

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: F109XY007MO - Till Upland Woodland

Hydric soil rating: No

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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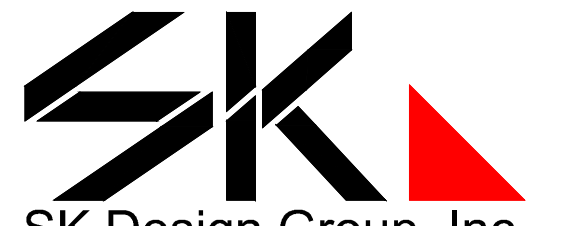
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C

SWPPP Details



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 www.skdg.com



SHEET HISTORY:

Notes for Concrete Washout:

- Concrete washout areas shall be installed prior to any concrete placement on site.
- Concrete washout areas shall include a 2' high concrete curb (2' high) on the side of the washout area. The slope facing out of the washout area shall be 2:1. The vehicle tracking post shall be sloped towards the concrete washout area.
- Vehicle tracking control is required at the access point to all concrete washout areas.
- Signs shall be placed at the construction site entrance, washout areas, and wherever necessary to clearly indicate the location(s) of the concrete washout areas to operators of concrete trucks and pump rigs.
- A one-piece impervious liner may be required along the bottom and sides of the washout area in sandy or gravelly soils.

Maintenance for Concrete Washout:

- Concrete washout materials shall be removed once the materials have filled the washout to approximately 75% full.
- Concrete washout areas shall be enlarged as necessary to maintain capacity for washed concrete.
- Concrete washout water, washed pieces of concrete and all other debris in the washout pit shall be transported from the job site in a water-tight container and disposed of properly.
- Concrete washout areas shall remain in place until all concrete for the project is placed.
- When concrete washout areas are removed, excavations shall be filled with suitable compacted backfill and topped, any disturbed areas consistent with the location, maintenance, and/or removal of the concrete washout areas shall be stabilized.

Notes for Construction Entrance:

- Avoid locating on steep slopes, at curves on public roads, or downhill of disturbed area.
- Remove all vegetation and other unsuitable material from the foundation area, grade, and crown for possible drainage.
- If slope towards the public road exceeds 2%, construct a 6- to 8-inch high ridge with 3/4" x 1/4" inch slope across the foundation approximately 15 feet from the edge of the public road to divert runoff from it.
- Install pipe under the entrance if needed to maintain drainage ditches along public roads.
- Place stone to dimensions and grade as shown on plans. Leave surface sloped for drainage.
- Divert all surface runoff and drainage from the entrance to a sediment control device.
- If conditions warrant, place geotextile fabric on the graded foundation to improve stability.

Maintenance for Construction Entrance:

- Reshape entrance as needed to maintain function and integrity of installation. Top dress with clean aggregate as needed.

CONCRETE WASHOUT

CONSTRUCTION ENTRANCE

AMERICAN PUBLIC WORKS ASSOCIATION
 KANSAS CITY METRO CHAPTER
 STANDARD DRAWING NUMBER ESC-01
 ADOPTED: 10/24/2016

Notes:

- In order to contain water, the ends of the silt fence must be turned uphill (Figure A).
- Long perimeter runs of silt fence must be similar to 100' runs should be broken up into several smaller segments to minimize water concentrations (Figure A).
- Long slopes should be broken up with intermediate rows of silt fence to slow runoff velocities.
- Attach fabric to upstream side of post.
- Install posts a minimum of 2' into the ground.
- Trenching will only be allowed for small or difficult installation, where staking machines cannot be reasonably used.

Maintenance:

- Remove and dispose of sediment deposits when the deposit approaches the height of silt fence.
- Repair as necessary to maintain function and structure.

JOINING FENCE SECTIONS

AMERICAN PUBLIC WORKS ASSOCIATION
 KANSAS CITY METRO CHAPTER
 STANDARD DRAWING NUMBER ESC-03
 ADOPTED: 10/24/2016

1 CONCRETE ENTRANCE & CONCRETE WASHOUT
 Not to Scale

2 SILT FENCE
 Not to Scale

Notes:

- Early Stage Area Inlet Sediment Barrier to be installed immediately after inlet or junction box is constructed.
- Silt fence shall remain in place until excavated area is removed and Late Stage Area Inlet is being installed.
- Backfill excavated area OMLY after final grading of the site. Stabilization of the site is to immediately follow.
- Wire reinforced silt fence may be used in place of silt fence attached to wood frame.

Notes:

- Remove deposited sediment from excavated storage areas when available storage trap has been reduced by 20%.
- Remove deposited sediment from filter socks or similar when any accumulation of sediment is visible.
- Repair or replace as necessary to maintain function and integrity of installation.

AREA INLET AND JUNCTION BOX PROTECTION

AMERICAN PUBLIC WORKS ASSOCIATION
 KANSAS CITY METRO CHAPTER
 STANDARD DRAWING NUMBER ESC-07
 ADOPTED: 10/24/2016

3 AREA INLET & JUNCTION BOX PROTECTION
 Not to Scale

Notes:

- Rock fill steeper than 3:1.
- Stabilize all disturbed areas downstream of outlet to the limits of disturbance.
- Alternative outlet protection and slope stabilization measures may be used with approval by the Engineer.
- Install riprap apron so that it is no higher than flowline of pipe.
- Reference APWA Specification 2850 for rock type, size, and placement.

OUTLET PROTECTION

AMERICAN PUBLIC WORKS ASSOCIATION
 KANSAS CITY METRO CHAPTER
 STANDARD DRAWING NUMBER ESC-14
 ADOPTED: 10/24/2016

4 OUTLET PROTECTION
 Not to Scale

100% Construction Documents
 University of Missouri South Farm -
 Swine Research and Education Facility Addition
 South Farm
 Columbia, MO 65201

CE No.: 624-223-23
 MU No.: CP230851

September 27, 2023

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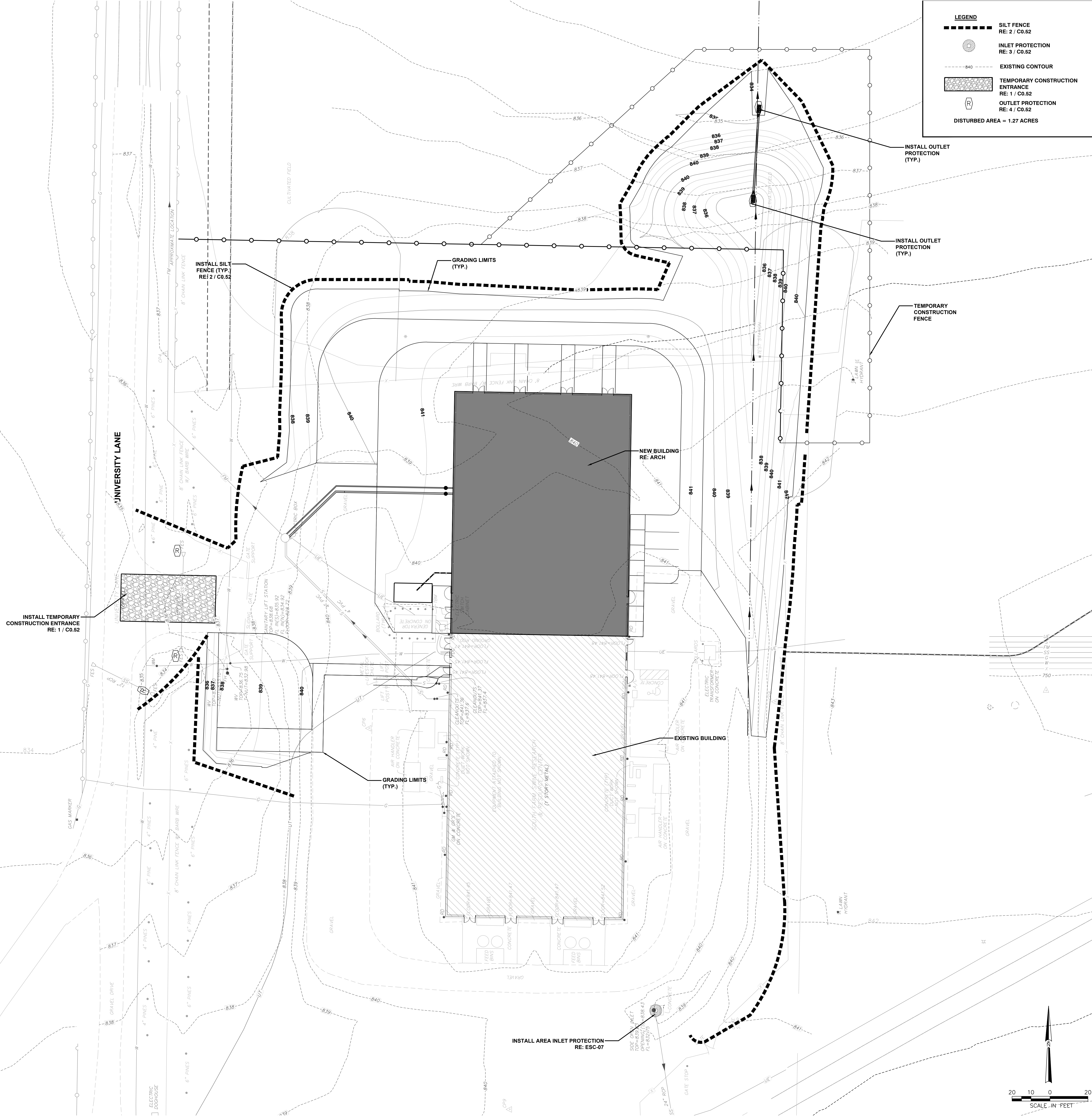
SITE EROSION CONTROL
 DETAILS

Appendix D
SWPPP Site Plan

EROSION CONTROL NOTES

- EXCEPT WHERE NECESSARY TO INSTALL EROSION AND SEDIMENT CONTROL DEVICES, CLEARING & DEMOLITION ACTIVITIES SHALL NOT BEGIN UNTIL ALL EROSION CONTROL DEVICES AND CONSTRUCTION FENCING HAVE BEEN INSTALLED AND APPROVED BY THE OWNER'S REPRESENTATIVE.
- THE CONTRACTOR SHALL PROVIDE FOR CONTROL OF SURFACE EROSION AND SEDIMENT DEPOSITION DURING ALL PHASES OF CONSTRUCTION AND UNTIL THE OWNER ACCEPTS THE WORK AS COMPLETE. THE CONTRACTOR SHALL PROVIDE TEMPORARY SEEDING, BERMS, SILT FENCE, SEDIMENT TRAPS, OR OTHER MEANS TO PREVENT SEDIMENT FROM REACHING THE PUBLIC RIGHT-OF-WAY, STREAMS OR ADJACENT FACILITIES. IN THE EVENT THE PREVENTION MEASURES ARE NOT EFFECTIVE, THE CONTRACTOR SHALL REMOVE ANY DEBRIS SEDIMENT AND RESTORE THE PROPERTY TO ITS ORIGINAL OR BETTER CONDITION.
- CONTRACTOR IS RESPONSIBLE FOR KEEPING ALL ROADWAYS & SIDEWALKS ADJACENT TO THE CONSTRUCTION SITE FREE OF DIRT AND DEBRIS RESULTING FROM ACTIVITIES RELATED TO THE CONSTRUCTION OF THIS PROJECT.
- THE CONTRACTOR SHALL CLEAN THE STREET ONCE PER DAY MINIMUM WHEN HEAVY TRACKOUT OCCURS. CONTRACTOR SHALL PROVIDE ADDITIONAL STREET CLEANING AT HIS OWN EXPENSE TO KEEP STREETS CLEAN FROM MUD AND DEBRIS AS NECESSARY.
- CONTRACTOR SHALL KEEP THE ENTIRE PROJECT SITE FREE OF DEBRIS AND TRASH AT ALL TIMES. CONTRACTOR SHALL EXECUTE WORK USING METHODS THAT MINIMIZE EXCESSIVE NOISE OR DUST EMISSIONS. CONTRACTOR SHALL PROVIDE METHODS, MEANS AND FACILITIES TO PREVENT CONTAMINATION OF SOIL OR WATER FROM DISCHARGE OF REGULATED MATERIALS (I.E. DIESEL FUEL) USED DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE SECONDARY CONTAINMENT WHEN MORE THAN 50 GALLONS OF FUEL ARE STORED ON SITE.
- STOCKPILE AREAS SHALL BE GRADED SUCH THAT THEY DO NOT EXCEED 3:1. SILT FENCE SHALL BE INSTALLED AROUND THE PERIMETER OF THE AREAS AND THE AREAS SHALL BE SEEDED WITHIN 14 DAYS ONCE CONSTRUCTION ACTIVITIES ON THEM CEASE.
- THE CONTRACTOR SHALL REQUEST THE OWNER'S REPRESENTATIVE TO INSPECT AND APPROVE THE SEDIMENT CONTROL MEASURES UPON THE COMPLETION OF VARIOUS STAGES OF THE WORK.
- CONTRACTOR MUST INSTALL AND MAINTAIN THE EROSION CONTROL MEASURES SHOWN ON THIS PLAN. IF THE ENGINEER, OWNER'S REPRESENTATIVE, DETERMINES THAT THE INSTALLATION OR THE MAINTENANCE IS INADEQUATE, THE CONTRACTOR MUST IMMEDIATELY CORRECT AT THEIR EXPENSE. IF IT IS DETERMINED THAT ADDITIONAL EROSION CONTROL MEASURES ARE NEEDED THE CONTRACTOR WILL BE DIRECTED TO INSTALL AND MAINTAIN THOSE MEASURES.
- FOLLOWING THE FINAL REMOVAL OF ALL EROSION CONTROL MEASURES THE CONTRACTOR SHALL RE-GRADE AND RE-SOD ALL AREAS THAT WERE DISTURBED BY THE REMOVAL.
- THE CONTRACTOR SHALL INSPECT THE LAND DISTURBANCE SITE AT LEAST ONCE EVERY SEVEN (7) DAYS AND WITHIN TWENTY-FOUR (24) HOURS FOLLOWING EACH RAINFALL EVENT OF 0.25" OR MORE WITHIN ANY TWENTY-FOUR (24) HOUR PERIOD. THE CONTRACTOR SHALL ALSO INSPECT AND ASSURE THAT ALL SEDIMENT CONTROL DEVICES ARE IN WORKING CONDITION PRIOR TO ANY FORECASTED RAINFALL.
- THE CONTRACTOR SHALL REMOVE SEDIMENT FROM THE FLOW AREAS AND MAKE ALL NECESSARY REPAIRS TO MAINTAIN THE INTEGRITY OF THE SEDIMENT CONTROL MEASURES. SEDIMENT SHALL BE REMOVED ONCE IT REACHES 1/2 THE INSTALLED HEIGHT OF MEASURE.
- SOME OF THE EROSION AND SEDIMENT CONTROL MEASURES WILL REQUIRE THE CONTRACTOR TO INSTALL, REMOVE, AND REINSTALL THE MEASURES AS CONSTRUCTION PROCEEDS. THE PHASING OF THIS WORK IS DEPENDENT ENTIRELY ON THE CONTRACTOR'S SCHEDULE, AND IS NOT SPECIFIED HEREIN. HOWEVER, THE CONTRACTOR SHALL COORDINATE THESE ACTIONS WITH THE ENGINEER AT THE TIMES ADJUSTMENTS ARE NEEDED.
- CONSTRUCTION FENCE SHALL BE APPROVED BY THE OWNER'S REPRESENTATIVE IN THE FIELD. CONTRACTOR SHALL SPRAY PAINT PROPOSED FENCE LOCATION FOR OWNER REVIEW AND APPROVAL PRIOR TO INSTALLATION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MOWING ALL AREAS WITHIN CONSTRUCTION FENCING.
- IMMEDIATE INITIATION OF TEMPORARY STABILIZATION BMPs ON DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED ON THAT PORTION OF THE PROJECT SITE IF CONSTRUCTION ACTIVITIES WILL NOT RESUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. TEMPORARY STABILIZATION MAY INCLUDE ESTABLISHMENT OF VEGETATION, GEOTEXTILES, MULCHES OR OTHER TECHNIQUES TO REDUCE OR ELIMINATE EROSION UNTIL EITHER FINAL STABILIZATION CAN BE ACHIEVED OR UNTIL FURTHER CONSTRUCTION ACTIVITIES TAKE PLACE TO RE-DISTURB THE AREA. THIS STABILIZATION MUST BE COMPLETED WITHIN 14 CALENDAR DAYS.
- AN INSPECTION LOG SHALL BE MAINTAINED AND SHALL BE AVAILABLE FOR REVIEW BY THE REGULATORY AUTHORITY.
- CONCRETE WASH OR RINSEWATER FROM CONCRETE MIXING EQUIPMENT, TOOLS AND/OR READY-MIX TRUCKS, TOOLS, ETC. MAY NOT BE DISCHARGED INTO OR BE ALLOWED TO RUN TO ANY EXISTING WATER BODY OR PORTION OF THE STORMWATER SYSTEM. ONE OR MORE LOCATIONS FOR CONCRETE WASH OUT WILL BE DESIGNATED ON SITE. SUCH THAT DISCHARGES DURING CONCRETE WASHOUT WILL BE CONTAINED IN A SMALL AREA WHERE WASTE CONCRETE CAN SOLIDIFY IN PLACE. PROPER SIGNAGE WILL BE INSTALLED TO DIRECT USERS TO THE CONCRETE WASHOUT. CONCRETE WASHOUTS MUST BE INSTALLED PRIOR TO POURING ANY CONCRETE.
- POLLUTION OF STREAMS, LAKES, WETLANDS, DRAINAGE WAYS OR STORM SEWERS FROM FUEL, OILS, HAZARDOUS CHEMICALS, SEDIMENT, TRASH, DEBRIS, OR OTHER SUBSTANCES RESULTING FROM CONSTRUCTION ACTIVITIES SHALL NOT BE ALLOWED. CONTRACTOR SHALL REPORT ALL SPILLS TO THE UNIVERSITY OF MISSOURI CONSTRUCTION MANAGER.
- NOTIFICATION TO ALL CONTRACTORS: THE PERMITTEE SHALL BE RESPONSIBLE FOR NOTIFYING EACH CONTRACTOR OR ENTITY (INCLUDING UTILITY CREWS AND CITY EMPLOYEES OR THEIR AGENTS) WHO WILL PERFORM WORK AT THE SITE OF THE EXISTENCE OF THE SWPPP AND WHAT ACTION OR PRECAUTIONS SHALL BE TAKEN WHILE ON-SITE TO MINIMIZE THE POTENTIAL FOR EROSION AND THE POTENTIAL FOR DAMAGING ANY BMP. THE SWPPP SHALL CONTAIN A LIST OF CONTRACTORS OR ENTITIES THAT HAVE BEEN NOTIFIED. THE PERMITTEE IS RESPONSIBLE FOR ANY DAMAGE A SUBCONTRACTOR MAY DO TO ESTABLISHED BMPs AND ANY SUBSEQUENT WATER QUALITY VIOLATION RESULTING FROM DAMAGE.

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LEGEND

- SILT FENCE RE: 2 / C0.52
- INLET PROTECTION RE: 3 / C0.52
- EXISTING CONTOUR
- TEMPORARY CONSTRUCTION ENTRANCE RE: 1 / C0.52
- OUTLET PROTECTION RE: 4 / C0.52

DISTURBED AREA = 1.27 ACRES

CLARK & ENERSEN

Architecture \ Engineering \ Interior Design \ Landscape Architecture \ Planning

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LEOK
 LEIGH + O'KANE

SHEET HISTORY:

100% Construction Documents
University of Missouri South Farm - Swine Research and Education Facility Addition
 South Farm
 Columbia, MO 65201

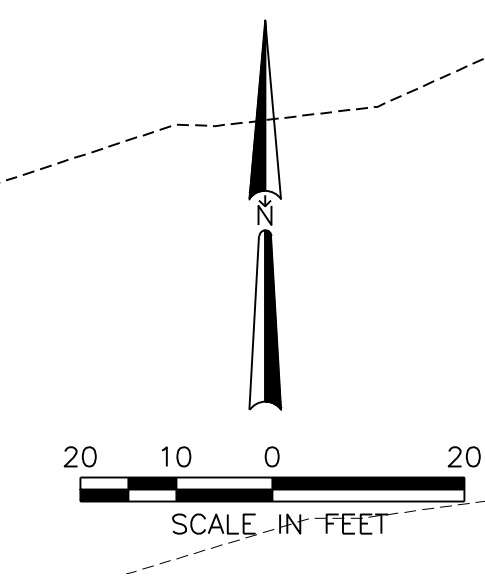
CE No.: 624-223-23
 MU No.: CP230851

September 27, 2023

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SITE EROSION CONTROL PLAN

C0.51



Appendix E
Construction Activity Record

Appendix F
Completed Inspection Forms

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No.: 624-223-23

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT TRACKING

1. GENERAL

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 01 General Requirements, apply to the work of this Section.

1.2 SUMMARY

- A. This Section specifies requirements for the Contractor's implementation of waste management controls and systems for the duration of the Work.

The intent of this Section is to develop and implement a Construction Waste Management Plan (CWMP) in order to quantify material diverted from Solid Waste Disposal Facility or incineration. Quantities must be reported by weight and consistent in units reported and calculation method throughout.

Diversion Methods and Materials Eligible for Reporting:

1. Appropriate materials suitably placed in a Clean Fill Site may be reported
2. Appropriate materials diverted for use as Wood Derived Fuel (WDF) may be reported

Diversion Methods and Materials Ineligible for Reporting:

3. Material disposal by incineration
4. Excavated soil and land-clearing debris
5. Material for use as Alternative Daily Cover (ADC)
6. Hazardous waste; should be disposed of according to relevant regulations

- B. Contractor may subcontract work of this Section to a sub-contractor specializing in recycling and salvaging of construction waste.

1.3 DEFINITIONS

- A. **ALTERNATIVE DAILY COVER (ADC):** Material (other than earthen material) that is placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day.
- B. **AVERAGE RECYCLING RATE:** The weighted average for the diversion of materials by the commingled (mixed-stream) recycling facility over time.
- C. **CLEAN FILL SITE:** Re-grading fill site for land reclamation or other beneficial use. Typically requiring permits, regular site maintenance and hours of operation. With material consisting of demolition debris and construction waste from buildings, roads and highway pavement, and other structures. Commonly comprised of brick, ceramics, concrete, and asphalt paving

Contract Documents

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Clark & Enersen Project No.: 624-223-23

fragments that are virtually inert and pose neither a pollution threat to ground or surface waters nor a fire hazard. May contain minimal amounts of wood, metal and inert solids.

- D. **COMMINGLED WASTE:** Waste streams that are combined on the project site and hauled away for sorting into recyclable streams. Also known as mixed or single-stream recycling.
- E. **DEMOLITION AND CONSTRUCTION DEBRIS:** Debris, waste and surplus materials, including recyclables, generated as a result of the Contractor's onsite activities while executing the requirements of the contract. Also, commonly includes materials from renovation, demolition, or deconstruction activities.
- F. **RECYCLE:** Recovery of materials, otherwise diverted from the solid waste stream for remanufacturing.
- G. **SALVAGE:** Recovery of useful items repurposing without the need for remanufacturing or reducing to raw materials due to their intrinsic value.
- H. **SOLID WASTE DISPOSAL FACILITY:** A managed landfill, regulated at the Federal, State, and/or Local level.

1.4 INTENT

- A. The Owner and Architect have established that this Project shall track the amount of Demolition and Construction debris. The Contractor shall develop and employ processes that ensure that the amount of demolition and construction debris actually generated during the execution of this project due to error, poor planning, breakage, mishandling, contamination or other factors is minimized.
- B. Of the construction and demolition debris generated, as much as is economically feasible shall be reused, salvaged, or recycled. Disposal of construction and demolition debris in solid waste disposal facilities shall be minimized to the greatest extent practical.
- C. The Contractor shall develop, for the Architect's review, a Construction Waste Management Plan (CWMP) for this Project.
- D. Contractor shall be responsible for ensuring that construction and demolition debris, not otherwise salvaged or recycled will be disposed of at appropriately licensed solid waste disposal facilities.

1.5 SUBMITTALS

- 1.6 **Construction Waste Management Plan (CWMP):** Within 21 calendar days after receipt of Notice to Proceed, the Contractor shall provide a plan for review and approval by architect and owner. The Construction Waste Management Plan shall be uploaded in the format provided at the end of this section (available for download here:

Contract Documents

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http://www.cf.missouri.edu/cf/pdc/contractor_information) and shall at a minimum contain the following:

1. Analysis of the proposed jobsite waste to be generated, including types and estimated quantities.
2. Solid Waste Disposal Facility Options: The name of the facilities landfills where construction and demolition debris not otherwise salvaged or recycled will be disposed of, the applicable landfill tipping disposal fees, and the projected cost of such disposal.
3. Solid Waste Disposal Facility Certification: Contractor's statement of verification that facilities proposed for use are licensed for types of waste to be deposited and have sufficient capacity to receive waste from this project.
4. Recycling Facility Options: Facilities providing commingled or mixed-stream recycling must provide diversion rates either specific to the project, or an average diversion rate that is regulated by the local or state authority. The average recycling rate for the facility must exclude ADC. Measurements must be based on weight (not volume), using scales. Reporting increments shall be no more than annually, and must use consistent time increments throughout calculations.
5. Alternatives: A list of each material proposed to be salvaged or recycled during the course of the Project and the planned reuse strategy or diversion destination of each. Include the following and any additional items proposed:
 - a. Cardboard
 - b. Clean wood
 - c. Beverage containers
 - d. Concrete
 - e. Slurry wall materials
 - f. Bricks and masonry
 - g. Asphalt
 - h. Metals from framing, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze
 - i. Mechanical and electrical equipment
 - j. Building components which can be removed relatively intact from existing construction
 - k. Packaging materials
 - l. Glass
 - m. Scraps from new gypsum wall board
 - n. Carpet and pad
 - o. Acoustical ceiling panels
 - p. Plastics
6. Meetings: A description of the regular meetings to be held to ensure proper execution of the construction waste management plan.
7. Debris Handling Procedures: A description of the means by which any construction waste materials identified above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

Contract Documents

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Clark & Enersen Project No.: 624-223-23

8. **Transportation:** A description of the means of transportation of the debris (whether debris will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).
- B. **Waste Management Progress Report:** Concurrent with each Application for Payment, submit a written Waste Management Progress Report in the same format as required for Final Report. Submission of this report shall be a pre-requisite to the Owner's approval of the Contractor's application for Payment. Provide statement indicating original estimated total diversion rate, diversion to date, and expected final diversion rate. Include narrative regarding discrepancies or activity since the previous report.
- C. **Waste Management Final Report:** Within five (5) calendar days of Substantial Completion, submit a written Construction Waste Management Final Report summarizing the types and quantities of materials recycled, salvaged and disposed of under the Construction Waste Management Plan. This report shall be in the same format as the monthly reports. Include the name and location of disposal facilities. Quantities must be reported by weight and consistent in units reported and calculation method throughout. Include the following:
1. Material category
 2. Generation point
 3. Total quantity of waste by category
 4. Total quantity of waste reused
 5. Total quantity of waste salvaged, both estimated and actual
 6. Total quantity of waste recycled, both estimated and actual
 7. Total quantity of waste diverted (salvaged and recycled)
 8. Total quantity of waste diverted (salvaged and recycled) as a percentage of total waste
- D. **Other Submittals:**
1. **Records of Donations:** Indicate receipt and acceptance of salvageable waste donated to individuals and organizations.
 2. **Records of Sales:** Indicate receipt and acceptance of salvageable waste sold to individuals and organizations.
 3. **Recycling and Processing Facility Records:** Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 4. **Landfill Disposal Records:** Indicate receipt and acceptance of waste by landfills facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 5. **Wood Derived Fuel Processing Facility Records:** Indicate receipt and acceptance of materials by (WDF) processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 6. **Statement of Refrigerant Recovery:** Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

2. PRODUCTS (NOT USED)

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No.: 624-223-23

3. EXECUTION

3.1 ON-SITE OPERATIONS

- A. **Manager:** The Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the Project.
- B. **Distribution:** The Contractor shall distribute copies of the Waste Management Plan to the Job Site Foreman, each Subcontractor, and the Owner's Representative.
- C. **Instruction:** The Contractor shall provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the Project.
- D. **Separation Facilities:** The Contractor shall lay out and label a specific area to facilitate separation of materials for recycling, salvage, and return. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials. Location shall be acceptable to the Owner's Representative.
 - 1. **Commingling Waste:** Commingling waste at the job site may be allowed, provided that the following conditions are met:
 - a. Comminglers shall be included in the Construction Waste Management Plan (CWMP)
 - b. Additional comminglers must be pre-approved by the Architect via CWMP addenda, prior to tipping on the job site.
- E. **Hazardous Wastes:** Any unforeseen hazardous wastes shall be separated, stored, and disposed of according to local regulations and as directed by the Owner.

Contract Documents

UM Project No.: CP230851
 Clark & Enersen Project No.: 624-223-23

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT PLAN EXAMPLE

Worksheet available for download here: http://www.cf.missouri.edu/cf/pdc/contractor_information

Construction Waste Management Report												
Recycled, Diverted, and Reused Materials - ACTUAL												
Matl. Stream	Date	Diversion Method / Location	Receipt #	Notes (Material)	Source	Units	Cubic Feet	Square Feet	Lineal Feet	Per Unit (lbs)	Weight (lbs)	Total Stream Weight (lbs)
Concrete Rubble												
	mm/dd/yyyy	eg: Clean Fill		eg: Somename Rd.	eg: Demolition						0.00	0.00
											0.00	
Dimensional Lumber and Wood Cut Pieces												
	mm/dd/yyyy	eg: ACME Inc. Compost		eg: misc wood	eg: Demolition						0.00	0.00
											0.00	
Clean Gypsum Wallboard												
	mm/dd/yyyy	eg: ACME Inc. Compost		eg: gyp board	eg: Demolition						0.00	0.00
											0.00	
Doors & Frames												
	mm/dd/yyyy	eg: SomeGroup Donation		eg: wood trim	eg: Demolition						0.00	0.00
											0.00	
Steel												
	mm/dd/yyyy	eg: ACME Inc. Recycling		eg: steel	eg: Demolition						0.00	0.00
											0.00	
Cardboard & Paper												
	mm/dd/yyyy	eg: ACME Inc. Recycling		eg: pkg boxes							0.00	0.00
											0.00	
Scrap Metal												
	mm/dd/yyyy	eg: ACME Inc. Recycling		eg: zinc/steel	eg: Demolition						0.00	0.00
											0.00	
Carpet & Padding												
	mm/dd/yyyy	eg: ACME Carpeting & Flooring		eg: carpet	eg: Demolition						0.00	0.00
											0.00	
Casework												
	mm/dd/yyyy	eg: University Salvage		eg: casework	eg: Demolition						0.00	0.00
											0.00	
Miscellaneous Equipment												
	mm/dd/yyyy	eg: ACME International Inc.		eg: misc	eg: Demolition						0.00	0.00
											0.00	
											ACTUAL Total Waste Diverted	0.00 (lbs)
Landfill Materials Description - ACTUAL												
Matl. Stream	Date	Diversion Method / Location	Receipt #	Notes (Material)	Source	Units	Cubic Feet	Square Feet	Lineal Feet	Per Unit (lbs)	Weight (lbs)	Total Stream Weight (lbs)
General Mixed Waste												
	mm/dd/yyyy	eg: ACME International Inc.		eg: misc	eg: Demolition						0.00	0.00
											0.00	
Alternative Daily Cover												
	mm/dd/yyyy	eg: ACME International Inc.		eg: misc	eg: Demolition						0.00	0.00
											0.00	
											ACTUAL Total Waste to Landfill	0.00 (lbs)
Total Construction Waste - ACTUAL											0.00	
Percentage of Waste Diverted From Landfill - ACTUAL											0.00%	

END OF SECTION 01 74 19

Contract Documents

UM Project No.: CP230851
Clark & Enersen Project No.: 624-223-23

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. A Commissioning Authority (CxA), appointed by the Owner, will manage the commissioning process.
- C. Related Sections include the following:
 - 1. Section 230800, Mechanical Commissioning Requirements, for specific requirements for commissioning HVAC systems.
 - 2. Section 260800, Electrical Commissioning Requirements, for specific requirements for commissioning electrical systems.
 - 3. Division 22, 23, and 26 Sections - Individual Sections stipulate installation, startup, warranty and training requirements for the system or device specified in that Section.

1.2 REFERENCES

- A. ASHRAE Guideline 0-2013: The HVAC Commissioning Process.
- B. ANSI/NEBB S110-2019 - Whole Building Technical Commissioning of New Construction

1.3 DEFINITIONS

- A. Acceptance Phase - The phase of the project when the facility and its systems and equipment are reviewed, tested, and verified. Most of the functional performance testing occurs during this phase of the project. It will generally occur after the Construction Phase is complete including execution of checklists and startup. The Acceptance Phase typically begins with Substantial Completion and ends with Functional Completion.
- B. ASHRAE - American Society of Heating, Refrigeration, and Air-Conditioning Engineers
- C. Commissioning (Cx) - The process of verifying all building systems are installed and perform interactively according to the design intent; the systems are efficient, cost effective and meet the Owner's operational needs; and the installation is adequately documented.
- D. Commissioning Authority (CxA) - An individual or company who will oversee the commissioning process; stipulate many of the commissioning requirements; and verify that

Contract Documents

UM Project No.: CP230851
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systems and equipment are designed, installed and tested to meet the Owner's requirements.

- E. Commissioning Team - A group of individuals who will collaborate to ensure the facility is fully and completely commissioned. This team will include the Commissioning Authority, the Owner's representative, the TAB contractor and a commissioning coordinator provided by the Contractor. Generally the installing contractor, subcontractor and manufacturer will also be an integral member of the team for any given system or equipment.
- F. Construction Phase – The phase of the project during which the facility is constructed and/or systems and equipment are installed and started. During this phase Contractors complete installation startup forms, submit operation and maintenance (O&M) information, establish trends, etc. The Construction Phase will generally end upon the completed startup and TAB of systems and equipment.
- G. Contractor - As used herein is a general reference to the applicable installing party and can therefore refer to the construction manager, general contractor, subcontractors, or vendors.
- H. Deficiency - An installation or condition that is not in conformance with the construction documents and/or the design intent.
- I. Functional Completion - A milestone that marks the successful completion of the Acceptance Phase. It generally includes the functional performance testing of the systems in the initial season.
- J. Functional Performance Testing - The dynamic testing of systems and equipment under various modes of operation and different conditions. Both component performance and environmental objectives will be monitored during this testing.
- K. Party - Individual, company or entity involved in the construction and commissioning activities of the project. Refer to the Commissioning Plan for names, roles and responsibilities.
- L. Prefunctional Check – The static testing of equipment to establish that the equipment has been installed correctly.
- M. Scheduled Outage – A period of time scheduled by the Owner in which the system is out of service or not in use by the occupants.
- N. Startup - A process whereby the Contractor verifies the proper installation of a device or piece of equipment, executes the manufacturer's starting procedures, completes the startup checklist, and energizes the device or system, and verifies it is in proper working order.
- O. Systems, Subsystems, and Equipment - Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- P. TAB - Testing, Adjusting and Balancing as specified in Section 230593.

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- Q. Warranty Phase - Includes the early occupancy of the building and continues through the warranty period into the opposite season from when the system was initially tested.

1.4 GENERAL DESCRIPTION

- A. Commissioning is a process to assure all building systems are installed and perform interactively according to the design intent; the systems are efficient, cost effective and meet the Owner's operational needs; the installation is adequately documented; and operating personnel are adequately trained. Commissioning serves as a tool to minimize post-occupancy operational problems. It establishes testing and communication protocols in an effort to advance building systems from installation to fully optimized operation.
- B. The Commissioning Authority will work with the Contractor to coordinate, oversee, and document the commissioning process during the Construction and Occupancy/Acceptance Phases of this project.
- C. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 2. Verify and document proper performance of equipment and systems.
 3. Verify that O&M documentation left on site is complete.
- D. Commissioning does not take away from or reduce the responsibility of the installing contractors to provide a finished and fully functioning product, nor does it replace the contractor's quality assurance and quality control responsibilities. Commissioning is the Owner's QA/QC and is not intended to be the Contractors QA/QC or project completion list.

1.5 COMMISSIONING TEAM

- A. Members Appointed by the Construction Manager, Sub Contractors, Architect and Engineer approved by the Owner's Representative: Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including project superintendent, architect and engineering design professionals, and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
1. Representatives of the facility user and operation and maintenance personnel.
 2. Architect and engineering design professionals who are not the Architect/Engineer designers of record.

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1.6 COMMISSIONING PROCESS

- A. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
1. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
 2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
 3. Equipment documentation is submitted to the CxA during normal submittals, including detailed startup procedures.
 4. The CxA works with the Contractors in developing startup plans and startup documentation formats, including providing the Contractors with prefunctional checklists to be completed, during the startup process. The CxA will review contractor submitted start-up plans in conjunction with the Owner. This includes review of any temporary system operational plans (if allowed by the Owner).
 5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
 6. The Contractors, under their own direction, execute and document the forms and checklists included in the startup plans. The CxA documents that the startup was completed according to the approved plans. This may include the CxA witnessing startup of selected equipment.
 7. The Commissioning Authority will review the submittal documents and the early operations and maintenance (O&M) material and develop functional testing procedures. The functional testing procedures will be reviewed with the design team and subcontractors as necessary to clarify operation.
 8. The functional tests are executed by the Contractors, under the direction of, and documented by the CxA.
 9. The CxA reviews equipment performance trend data obtained during the maximum heating and cooling seasons.
 10. The CxA reviews the O&M documentation for completeness and accuracy.
 11. Deferred testing is conducted, as specified or required.

1.7 CONTRACTOR'S RESPONSIBILITIES

- A. Facilitate the coordination of the commissioning work by the CxA, and ensure that commissioning activities are being included in the project schedule.

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- B. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
- C. Furnish a copy of all construction documents, addenda, change orders, and approved submittals and shop drawings related to commissioned equipment to the CxA.
- D. Where acceptance testing is to be executed by the system/equipment provider, the Contractor, with the CxA's assistance, will develop final acceptance test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
 - 1. Name and/or identification of tested item
 - 2. Time and date of test
 - 3. Deficiencies with issue number, if any, generated as the result of test
- E. Review commissioning progress and deficiency reports.
- F. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
- G. Assist the CxA as necessary in the deferred testing and deficiency corrections required by the specifications.
- H. Certificate of Readiness shall be provided and signed by Contractor, sub-contractor(s), and installer(s) for each system certifying that all subsystems, equipment, test and balancing, and associated controls are ready for testing. Completed startup plan checklists shall accompany this certificate.
- I. Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 - 1. Participate in construction-phase commissioning coordination meetings.
 - 2. Participate in maintenance orientation and observation.
 - 3. Certify that Work is complete and systems are operational according to the Contract Documents, including test and balancing and calibration of instrumentation and controls.
 - 4. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
- J. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:

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1. Participate in construction-phase commissioning coordination meetings.
2. Participate in maintenance orientation and observation.
3. Provide information to the CxA for updating construction-phase commissioning plan.
4. Provide updated Project Record Documents to the CxA on a regular basis.
5. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CM and CxA, as specified in Division 1, Operating Instructions and Service Manual Log.

1.8 CxA'S RESPONSIBILITIES

- A. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving of non-conformance or deficiencies, but ultimately that responsibility resides with the CM and the A/E. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents.
- B. At the beginning of the construction phase, an initial construction-phase coordination meeting will be held for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; TAB Work; and Project completion.
- C. Commissioning team meetings will be held no less frequently than monthly and as frequently as weekly, depending on the current level of commissioning activities. Meetings shall be held for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes.

1.9 COMMISSIONING DOCUMENTATION

- A. Commissioning Plan: A living document, prepared and maintained by the CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:
 1. Plan for delivery and review of submittals and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes.
 2. Identification of systems and equipment to be commissioned.
 3. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
 4. Identification of items that must be completed before the next operation can proceed.
 5. Description of responsibilities of commissioning team members and listing of contact information for each party.

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6. Schedule for commissioning activities to be coordinated with overall construction schedule.
 7. Process and schedule for completing prestart and startup and prefunctional checklists for systems, subsystems, and equipment to be verified and tested.
 8. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.
- B. Certificate of Readiness: Certificate of Readiness shall be provided and signed by Contractor, sub-contractor(s), and installer(s) for each system certifying that all subsystems, equipment, and associated controls are ready for testing. Completed startup plan checklists shall accompany this certificate.

1.10 QUALITY ASSURANCE

- A. Test Equipment Calibration: Contractors shall comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 SYSTEMS TO BE COMMISSIONED

- A. See specification sections 230800, Mechanical Commissioning Requirements and 260800, Electrical Commissioning Requirements for lists of systems and equipment to be commissioned.

3.2 STARTUP AND PRE-FUNCTIONAL CHECKLISTS

- A. The following procedures apply to all equipment to be commissioned, according to Section 3.1, Systems to be Commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified startup plans.
- B. General: Startup and pre-functional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used. The startup and pre-functional checklists for a given system must be successfully completed

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prior to formal functional performance testing of equipment or subsystems of the given system.

C. **Startup Plan:** The CxA shall assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures have been completed.

1. The contractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the representative checklists and procedures from specifications 230800 and/or 260800 with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and observations of each procedure and a summary statement with a signature block at the end of the plan.
2. The full startup plan could consist of something as simple as:
 - a. The approved startup and checkout procedures and CxA-provided pre-functional checklists.
 - b. The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - c. The contractor's normally used field checkout sheets.
3. The contractor submits the full startup plan to the CxA for review and approval.
4. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
5. The approved startup plan is provided to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.

D. **Execution of Startup Plan**

1. Four weeks prior to startup, the Contractors and vendors schedule startup and checkout with the CM and CxA. The performance of the startup plans is directed and executed by the Contractor. When checking off pre-functional checklists, signatures may be required of other Contractors for verification of completion of their work.
2. The Contractors and vendors shall execute the startup and provide the CxA with a signed and dated copy of the completed startup plans.
3. Only individuals that have direct knowledge and witnessed that a line-item task on the startup plan was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.
4. Items left incomplete, which later cause deficiencies or delays during functional testing may result in backcharges to the responsible party.

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3.3 FUNCTIONAL PERFORMANCE TESTING

- A. **Objectives and Scope:** The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, no flow, equipment failure, etc. shall also be tested.
- B. **Development of Test Procedures.** Before test procedures are written, the contractor shall provide the CxA with all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the provided data, the CxA will develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Contractor or vendor responsible to execute a test, shall provide limited assistance to the CxA in developing the procedures review (e.g. answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the Commissioning Team to review for feasibility, safety, equipment and warranty protection. The CxA may submit the tests to the A/E for review, if requested.
- C. **Coordination and Scheduling:** The Contractor shall provide sufficient notice to the CxA prior to commencement of any equipment/system startup, acceptance testing, observation, demonstrations, or other events which form a part of formal acceptance. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Contractors shall execute the tests. In general, functional testing is conducted after startup has been satisfactorily completed. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- D. **Problem Solving.** The CxA may recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor and A/E.
- E. **Opposite Season Testing:** Testing procedures shall be repeated and/or conducted as necessary during appropriate seasons. "Opposite season" testing will be required where scheduling prohibits thorough testing in all modes of operation.

3.4 DOCUMENTATION OF NON-CONFORMANCE AND APPROVAL OF TESTS

- A. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.

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1. When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it:
 - a. The CxA documents the deficiency and the Contractor's intentions and testing proceeds.
 - b. Once the Contractor has corrected the deficiency, the CxA shall be notified in writing that the issue has been FIXED certifying that the equipment is ready to be retested.
 - c. The test is repeated and the deficiency status will be changed to either ACCEPTED to close the issue or, if the issue was not properly resolved, the issue status will be will changed back to OPEN.
 2. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - a. The deficiency shall be documented on the project commissioning issues log with the Contractor's response and issued to the Commissioning Team.
 - b. Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority and acceptance authority is with the Owner.
 - c. The CxA documents the resolution process on the project deficiency log.
 - d. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency and the CxA shall be notified in writing that the issue has been FIXED certifying that the equipment is ready to be retested. The test is repeated until satisfactory performance is achieved.
- B. Cost of Retesting
1. For a deficiency identified, not related to any pre-functional checklist or startup fault, the following shall apply: The equipment will be retested once under the original contract. However, the CxA's time for a second retest will be charged to the Owner, who may choose to recover costs from the Contractor.
 2. The time for the CxA to direct any retesting required because a specific pre-functional checklist or startup test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be charged to the Owner, who may choose to recover costs from the Contractor.
 3. The Contractor shall respond in writing to the CxA at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
 4. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- C. Functional Test Approval: The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA. The CxA recommends acceptance of each test to the Owner using a standard form. The

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Owner gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

3.5 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner. These tests will be conducted in the same manner as the seasonal tests as soon as possible.

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

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

- B. Related Requirements:

- 1. Section 01 10 00 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 01 73 00 "Execution" for cutting and patching procedures.
- 3. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

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1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Submit before Work begins.

1.7 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.

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- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If 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. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

- A. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

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/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

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- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated 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.
 - 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.
- B. Existing Services/Systems to Be Remain: Where services and systems that are to remain are impacted by the removal or demolition of other work (i.e. removal of ceiling grid that support lights and/or diffusers), the Contractor shall restore the services and systems back to original operation and/or location using materials, supports, and requirements outlined in the project specifications without additional compensation.

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3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

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8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Store items in a secure area until delivery to Owner.
2. Transport items to Owner's storage area designated by Owner.
3. Protect items from damage during transport and storage.

C. 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.

- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

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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.

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Form-facing material for cast-in-place concrete.

1.3 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.

1.4 ACTION SUBMITTALS

1.5 INFORMATIONAL SUBMITTALS

1.6 QUALITY ASSURANCE

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Form Liners: Store form liners under cover to protect from sunlight.
- B. Insulating Concrete Forms: Store forms off ground and under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.
- C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

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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.
 - a. For architectural concrete specified in Section 033300 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).

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.
- C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.3 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than **0.022-inch** thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than **0.034 inch** thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, **3/4 by 3/4 inch**, minimum.

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- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. 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.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with **ACI 301**.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of **ACI 117** and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes .
- C. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, **1 inch**.
 - 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.

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1. Provide and secure units to support screed strips
 2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
 2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than **12 inches**.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
1. Determine sizes and locations from trades providing such items.
 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 3. Place joints perpendicular to main reinforcement.
 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 6. Space vertical joints in walls as indicated on Drawings .
 - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

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- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
 - 5. Clean embedded items 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.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- 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.

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SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.

B. Related Requirements:

1. Section 03 38 16 "Unbonded Post-Tensioned Concrete" for reinforcing related to post-tensioned concrete.
2. Section 03 41 00 "Precast Structural Concrete" for reinforcing used in precast structural concrete.
3. Section 03 45 00 "Precast Architectural Concrete" for reinforcing used in precast architectural concrete.
4. Section 32 13 13 "Concrete Paving" for reinforcing related to concrete pavement and walks.
5. Section 32 13 16 "Decorative Concrete Paving" for reinforcing related to decorative concrete pavement and walks.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

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1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For testing and inspection agency.
- B. Welding certificates.
 - 1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
 - 2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
- D. 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.
- E. Field quality-control reports.

1.4 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.
- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.
 - 1. Store reinforcement to avoid contact with earth.
 - 2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
 - 3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
 - 4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 STEEL REINFORCEMENT

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

2.3 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.

2.4 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.

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- 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 to be lapped not less than 36 bar diameters at splices, or **24 inches**, whichever is greater.
 - 2. Stagger splices in accordance with **ACI 318**.
 - 3. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

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. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:

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1. Steel-reinforcement placement.

- D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

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SECTION 03 30 00 - 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 03 10 00 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 03 33 00 "Architectural Concrete" for general building applications of specially finished formed concrete.
4. Section 03 35 43 "Polished Concrete Finishing" for concrete floors scheduled to receive a polished concrete finish.
5. Section 03 53 00 "Concrete Topping" for emery- and iron-aggregate concrete floor toppings.
6. Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-ground.
7. Section 32 13 13 "Concrete Paving" for concrete pavement and walks.
8. Section 32 13 16 "Decorative Concrete Paving" for decorative concrete pavement and walks.

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.

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- 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. Semirigid joint fillers.
 - d. Vapor-retarder installation.
 - e. Anchor rod and anchorage device installation tolerances.
 - f. Cold and hot weather concreting procedures.
 - g. Concrete finishes and finishing.
 - h. Curing procedures.
 - i. Forms and form-removal limitations.
 - j. Shoring and reshoring procedures.
 - k. Methods for achieving specified floor and slab flatness and levelness.
 - l. Floor and slab flatness and levelness measurements.
 - m. Concrete repair procedures.
 - n. Concrete protection.
 - o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
 - p. Protection of field cured field test cylinders.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Silica fume.
5. Aggregates.
6. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
7. Vapor retarders.
8. Curing materials.
 - a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
9. Joint fillers.
10. 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.

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5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. 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. Bonding agents.
5. Adhesives.
6. Vapor retarders.
7. Semirigid joint filler.
8. Joint-filler strips.
9. Repair materials.

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

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

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5. Aggregates.
6. 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 to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to 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 to 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**.

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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.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless 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.

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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/II, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
4. Silica Fume: ASTM C1240 amorphous silica.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:
 - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
 - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

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: ASTM C494/C494M, Type A.

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 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Stego Industries, LLC.
 - b. W. R. Meadows, Inc.

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2.4 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
 - 1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- B. Water: Potable or complying with ASTM C1602/C1602M.
- C. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dayton Superior Corporation.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. SpecChem, LLC.
- D. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dayton Superior Corporation.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. SpecChem, LLC.

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Floor Slab Protective Covering: 8-feet- wide cellulose fabric.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. McTech Group, Inc.

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2.6 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.

2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with **ACI 301**.
1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash or Other Pozzolans: 25 percent by mass.
 2. Slag Cement: 50 percent by mass.
 3. Silica Fume: 10 percent by mass.
 4. 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.
 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.

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- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
1. Use water-reducing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.

2.8 CONCRETE MIXTURES

- A. Class A : Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: **ACI 318 F2** .
2. Minimum Compressive Strength: **4000 psi** at 28 days.
3. Maximum Dry Shrinkage in Accordance with ASTM C157: 0.05%
4. Slump Limit: **8 inches** , plus or minus **1 inch** for concrete with verified slump of **3 inches** plus or minus **1 inch** before adding high-range water-reducing admixture or plasticizing admixture at Project site .
5. Air Content:
 - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing **3/4-inch** nominal maximum aggregate size .
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

- B. Class B : Normal-weight concrete used for foundation walls.

1. Exposure Class: **ACI 318 F2** .
2. Minimum Compressive Strength: **4000 psi** at 28 days.
3. Maximum Dry Shrinkage in Accordance with ASTM C157: 0.05%
4. Slump Limit: **8 inches** , plus or minus **1 inch** for concrete with verified slump of **3 inches** plus or minus **1 inch** before adding high-range water-reducing admixture or plasticizing admixture at Project site .
5. Air Content:
 - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing **3/4-inch** nominal maximum aggregate size .
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

- C. Class C : Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: **ACI 318 C0** .
2. Minimum Compressive Strength: **4000 psi** at 28 days.
3. Maximum Dry Shrinkage in Accordance with ASTM C157: 0.05%
4. Minimum Cementitious Materials Content: **540 lb/cu. yd.** .
5. Slump Limit: **8 inches** , plus or minus **1 inch** for concrete with verified slump of **3 inches** plus or minus **1 inch** before adding high-range water-reducing admixture or plasticizing admixture at Project site .
6. Air Content:
 - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

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7. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, 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. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

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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.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

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 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 spaced at 20 feet maximum . 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:

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1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch**. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch**- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 2. Terminate full-width joint-filler strips not less than **1/2 inch** or more than **1 inch** below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. 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.

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- 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, .
2. **ACI 301** Surface Finish SF-3.0:
 - a. Patch voids larger than **3/4 inch** wide or **1/2 inch** deep.
 - b. Remove projections larger than **1/8 inch**.
 - c. Patch tie holes.
 - d. Surface Tolerance: **ACI 117** Class A.

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- e. Locations: Apply to concrete surfaces to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete .

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.
- d. Maintain required patterns or variances as shown on Drawings or to match design reference sample .

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 concrete floor toppings .

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with **ACI 117** tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo .

D. Trowel Finish:

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1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
 2. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.
 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 4. Do not add water to concrete surface.
 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
 6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system .
 7. Finish surfaces to the following tolerances, in accordance with **ASTM E1155**, for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, **10-ft.-** long straightedge resting on two high spots and placed anywhere on the surface does not exceed **1/8 inch** .
 - b. Suspended Slabs:
 - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, **10-ft.-** long straightedge resting on two high spots and placed anywhere on the surface does not exceed **1/8 inch** .
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces . While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
1. Coordinate required final finish with Architect before application.
 2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 2. Coordinate required final finish with Architect before application.
- 3.9 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.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

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C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases **4 inches** high unless otherwise indicated on Drawings, and extend base not less than **6 inches** in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: **4000 psi** at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **12-inch** centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

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.

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- 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.

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- a) Lap edges and ends of absorptive cover not less than **12 inches**.
- b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
- 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
 - 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
 - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
 - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.
- e. Floors to Receive Urethane Flooring:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped **6 inches** and sealed in place.
 - 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
 - 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.
- f. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
- g. Floors to Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

- A. Conform to **ACI 117**.

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3.12 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.

3.13 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:

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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.

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3.14 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 to 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 to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency to 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 to 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.

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6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to 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 to 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 five 12-inch 4-inch by 8-inch cylinder specimens for each composite sample.
 7. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one laboratory-cured specimens at seven days and one set of three specimens at 28 days.
 - b. A compressive-strength test to be the average compressive strength from a set of three 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 to 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 to 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.

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- 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 to 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.

3.15 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 03 30 00

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SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Miscellaneous masonry accessories.

B. Related Requirements:

1. Section 05 12 00 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
2. Section 07 19 00 "Water Repellents" for water repellents applied to unit masonry assemblies.

1.2 DEFINITIONS

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

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

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

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1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Integral water repellent used in CMUs.
 - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 4. Mortar admixtures.
 - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 6. Grout mixes. Include description of type and proportions of ingredients.
 - 7. Reinforcing bars.
 - 8. Joint reinforcement.
 - 9. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 - 2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

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.

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- 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.
- 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.

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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 structural 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) in accordance with TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units are 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 square-edged units for outside corners unless otherwise indicated.

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B. Integral Water Repellent: Provide units made with integral water repellent where indicated.

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 in accordance with 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, show no visible water or leaks on the back of test specimen.
 - a. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) ACM Chemistries.
 - 2) Acme Brick Company.
 - 3) Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
 - 4) GCP Applied Technologies Inc.
 - 5) Master Builders Solutions; brand of MBCC Group.
 - 6) Moxie International.

C. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi .
2. Density Classification: Normal weight .
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.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 MASONRY LINTELS

A. General: Provide one of the following:

- B. 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. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content is not more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

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- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
 - D. 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.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
 - E. Aggregate for Grout: ASTM C404.
 - F. Epoxy Pointing Mortar: ASTM C395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.
 - G. 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.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
 - b. GCP Applied Technologies Inc.
 - H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACM Chemistries.
 - b. Euclid Chemical Company (The); a subsidiary of RPM International, Inc.
 - c. GCP Applied Technologies Inc.
 - d. Master Builders Solutions; brand of MBCC Group.
 - I. Water: Potable.
- 2.7 REINFORCEMENT
- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, **Grade 60**.

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- 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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Heckmann Building Products, Inc.
 - b. Hohmann & Barnard, Inc.
 - c. Wire-Bond.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951/A951M.
1. Interior Walls: Hot-dip galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon steel.
 3. Wire Size for Side Rods: **0.187-inch** diameter.
 4. Wire Size for Cross Rods: **0.187-inch** diameter.
 5. Spacing of Cross Rods: Not more than **16 inches** o.c.
 6. Provide in lengths of not less than **10 feet** , with prefabricated corner and tee units.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
 3. For exterior masonry, use portland cement-lime mortar.
 4. For reinforced masonry, use portland cement-lime 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.

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- 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. 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 in accordance with ASTM C143/C143M.
- D. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
 - 1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

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 would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. 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,

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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.

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**.

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**.

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.

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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 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.

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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.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 2. Wet joint surfaces thoroughly before applying mortar.
 3. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of **1/4 inch** and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of **5/8 inch** on exterior side of walls, **1/2 inch** elsewhere. Lap reinforcement a minimum of **6 inches**.
1. Space reinforcement not more than **16 inches** o.c.
 2. Space reinforcement not more than **8 inches** o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than **8 inches** above and below wall openings and extending **12 inches** beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

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3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than **1 inch** wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than **24 inches** o.c. vertically and **36 inches** o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 2. Install preformed control-joint gaskets designed to fit standard sash block.
 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

- A. Provide masonry lintels where shown and where openings of more than **12 inches** for brick-size units and **24 inches** for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of **8 inches** at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

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2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than **60 inches**.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements is done at Contractor's expense.
- B. Inspections: Special inspections in accordance with 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, in accordance with ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- G. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.
- I. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at 7 days and at 28 days.

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3.12 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.

3.13 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 concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

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1. Crush masonry waste to less than **4 inches** in each dimension.
 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 3. Do not dispose of masonry waste as fill within **18 inches** of finished grade.
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Miscellaneous steel trim.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

C. Related Requirements:

1. Section 04 20 00 "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:

1. Shop primers.

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.

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2. Miscellaneous steel trim including steel angle corner guards steel edgings and loading-dock edge angles.
3. Loose steel lintels.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Research Reports: For post-installed anchors.
- C. Delegated design engineer qualifications.

1.5 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."

1.6 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

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 Tubing: ASTM A500/A500M, cold-formed steel tubing.

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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. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- E. Post-Installed Anchors: Torque-controlled expansion 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.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

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- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- H. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches**, with a minimum **6-inch** embedment and **2-inch** hook, not less than **8 inches** from ends and corners of units and **24 inches** o.c., unless otherwise indicated.

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2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.7 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime miscellaneous steel trim with primer specified in Section 099600 "High-Performance Coatings."

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with primer specified in Section 099600 "High-Performance Coatings."

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.

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- 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.
- D. Prime loose steel lintels located in exterior walls with primer specified in Section 099600 "High-Performance Coatings."

2.10 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.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099113 "Exterior Painting" unless primers specified in Section 099600 "High-Performance Coatings" are indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
 - 5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

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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.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

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3.3 INSTALLATION OF MISCELLANEOUS STEEL TRIM

- A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.4 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.

3.5 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil** dry film thickness.
 - 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

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SECTION 05 50 51 – ANIMAL PENNING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including general and supplementary conditions and division 1 specification sections, apply to work of this section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Stainless Steel Animal Penning systems for swine.
 - 2. Stainless Steel Swine Feeders
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. See Section 05 50 00 "Steel Fabrications".

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Determine allowable working stresses of materials based on the following:
- B. Stainless Steel: ASCE "Specification for the design of cold formed Stainless Steel Structural Members.

1.4 SUBMITTALS

- A. Product data for products used in stainless steel animal penning and feeders.
- B. Shop drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Mock Up: Provide a full-size mockup in the field of one (1) 9'-6" deep x 7'-0" wide x 40" high pen. All anchors and hardware shall be included as part of the mockup. Mock up can be utilized for final construction. Schedule installation and owner review of mock up prior to finalization of Penning submittal.

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1.5 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators in accordance with American Welding Society (AWS) "Standard Qualification Procedure".
- B. WARRANTIES
 - 1. Stainless Steel Penning Warranty: Submit a written warranty, executed by the manufacturer, agreeing to repair or replace equipment components that fail in materials or workmanship within the specified warranty period.
 - 2. Warranty Period: Twenty Years from the date of substantial completion.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Where animal pens and gates are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Thorp Equipment, Incorporated
 - 2. Britz-Heidbrink, Incorporated

2.2 STAINLESS STEEL PENNING

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- C. Corner Posts: Stainless Steel, 12 ga., minimum
- D. Base Plates: Stainless Steel, 8 ga., minimum
- E. Custom Stainless Steel Pens:
 - 1. Configure per drawings on sheet A1.13
 - 2. 16 gauge - 1 1/2" O.D. tubes at top, bottom, and sides
 - 3. 3/4" Vertical spindles at 3" o.c.
Penning to withstand a minimum concentrated lateral load of 200lbs and a minimum linear load of 50 lbs per running foot.

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- F. Hinge / Connection pins: Type 304 Stainless Steel

2.3 FABRICATION, GENERAL

- A. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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. Allow for thermal movement resulting from change in ambient temperature in the design, fabrication, and installation of metal assemblies.
- C. Weld corners and seams continuously to comply with AWS recommendations. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed connections, finish so that no roughness shows and contour matches adjacent.
- D. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.
- E. Fabricate joints that will be exposed to power washing in a manner to exclude water.

2.4 MISCELLANEOUS FRAMING AND WALL SUPPORTS

- A. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from stainless steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

2.5 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete. Drill plates to receive anchor bolts and for grouting as required.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing to in-place construction. Expansion anchor base plates to concrete slab. Expansion anchor wall plates to concrete masonry unit wall. All hardware shall be stainless steel. Bolts shall be ground smooth at top of each nut or sized to minimize protrusion into penning area.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and

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elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- C. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds and methods used in correcting work.
- D. 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.

3.2 ADJUSTING AND CLEANING

- A. Immediately after erection clean field welds.
- B. Adjust hinge pin connections to ensure smooth operation.
- C. Clean all stainless-steel penning and accessories after adjacent construction work has been completed.

END OF SECTION 05 50 51

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Shear wall panels.
3. Rooftop equipment bases and support curbs.
4. Wood blocking , cants, and nailers.
5. Wood furring and grounds.
6. Wood sleepers.
7. Plywood backing panels.

B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 06 17 53 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
3. Section 31 31 16 "Termite Control" for site application of borate treatment to wood framing.

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** size or greater but less than **5 inches nominal** size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of **5 inches nominal** size or greater in least dimension.
- F. Lumber grading agencies, and abbreviations used to reference them, include the following:
1. NeLMA: Northeastern Lumber Manufacturers' Association.
 2. NLGA: National Lumber Grades Authority.
 3. SPIB: The Southern Pine Inspection Bureau.
 4. WCLIB: West Coast Lumber Inspection Bureau.
 5. WWPA: Western Wood Products Association.

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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 wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.
 4. Shear panels.
 5. Power-driven fasteners.
 6. Post-installed anchors.
 7. Metal framing anchors.
 8. Sill sealer gasket/termite barrier.
- C. Qualification Statements: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

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1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products 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: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 4. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber:
1. Boards: 19 percent.
 2. Dimension Lumber: 19 percent unless otherwise indicated.
 3. Timber: 19 percent .
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

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2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than **18 inches** above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT TREATMENT

- A. General: Where fire-retardant-treated materials are indicated, materials are to 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 is not to promote corrosion of metal fasteners.

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2. Exterior Type: Treated materials are to 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 are to have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber is to be tested according to ASTM D5664 and design value adjustment factors are to be calculated according to ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations are not to bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
1. Framing for raised platforms.
 2. Framing for stages.
 3. Concealed blocking.
 4. Framing for non-load-bearing exterior walls.
 5. Roof construction.
 6. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A. Ceiling Joists: Construction or No. 2 grade.
1. Species:
 - a. Spruce-pine-fir; NLGA.
- B. Joists, Rafters, and Other Framing by Grade: No. 2 grade.
1. Species:
 - a. Spruce-pine-fir; NLGA.

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2.5 SHEAR WALL PANELS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
1. Simpson Strong-Tie Co., Inc.
- B. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I plywood or OSB sheathing.
- C. Allowable design loads, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.6 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
1. Spruce-pine-fir; NLGA.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
1. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

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2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C , in thickness indicated or, if not indicated, not less than **3/4-inch** nominal thickness.

2.8 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than **1-1/2 inches** into wood substrate.
1. Where rough 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 or ASTM F2329 .
 2. For pressure-preservative-treated wood, use stainless steel fasteners.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.9 METAL FRAMING ANCHORS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
1. Simpson Strong-Tie Co., Inc.
- B. Allowable design loads, as published by manufacturer, are to meet or exceed those indicated of basis-of-design products . Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- C. 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.
- D. Joist Hangers: U-shaped joist hangers as indicated.
- E. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member as indicated.

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- F. Bridging: Rigid, V-section, nailless type, **0.050 inch** thick, length to suit joist size and spacing.
- G. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post **1 inch** above base and with **2-inch-** minimum side cover, socket **0.062 inch** thick, and standoff and adjustment plates **0.108 inch** thick.
- H. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: **1-1/4 inches**.
 - 2. Thickness: **0.062 inch**.
 - 3. Length: As required. .
- I. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, **1-1/2 inches** wide by **0.050 inch** thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- J. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, **2-1/4 inches** wide by **0.062 inch** thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- K. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, **1-1/4 inches** wide by **0.050 inch** thick by **36 inches** long.
- L. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods as indicated.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets:
 - 1. Closed-cell neoprene foam, **1/4 inch** thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

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- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- 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 or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches** o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal** thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft.** and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet** o.c.
- J. 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.
- K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

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- M. Securely attach rough 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 (IBC).
 - 2. ICC-ES evaluation report for fastener.
- N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- O. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 INSTALLATION OF WOOD FURRING

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install **1-by-3-inch nominal**- size furring horizontally and vertically at **24 inches** o.c.
- C. Furring to Receive Gypsum Board : Install **1-by-2-inch nominal**- size furring vertically at **16 inches** o.c.

3.4 INSTALLATION OF WALL AND PARTITION FRAMING

- A. General: Provide single bottom plate and double top plates using members of **2-inch nominal** thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.

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1. For exterior walls, provide **2-by-6-inch nominal**- size wood studs spaced **16 inches** o.c. unless otherwise indicated.
 2. For interior partitions and walls, provide **2-by-4-inch nominal**- size wood studs spaced **16 inches** o.c. unless otherwise indicated.
 3. Provide continuous horizontal blocking at midheight of partitions more than **96 inches** high, using members of **2-inch nominal** thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs , except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.

3.5 INSTALLATION OF FLOOR JOIST FRAMING

- A. General: Install floor joists with crown edge up and support ends of each member with not less than **1-1/2 inches** of bearing on wood or metal, or **3 inches** on masonry. Attach floor joists as follows:
1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends **3 inches** and do not embed more than **4 inches**.
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds **48 inches**.
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than **2 inches** from top or bottom.
- E. Provide solid blocking of **2-inch nominal** thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than **4 inches** or securely tie opposing members together. Provide solid blocking of **2-inch nominal** thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with **1/4-by-1-1/4-inch** metal strap anchors spaced not more than **96 inches** o.c., extending over and fastening to three joists. Embed anchors at least **4 inches** into grouted masonry with ends bent at right angles and extending **4 inches** beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.

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- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of **96 inches** o.c., between joists.
 1. Diagonal wood bridging formed from bevel-cut, **1-by-3-inch nominal-** size lumber, double-crossed and nailed at both ends to joists.
 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.6 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate, and nail to first joist or anchor with framing anchors or metal straps. Provide **1-by-8-inch nominal-** size or **2-by-4-inch nominal-** size stringers spaced **48 inches** o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and **2 inches** deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and **2 inches** deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.7 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

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SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Sheathing joint-and-penetration treatment materials.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for plywood backing panels.
2. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Sheathing joint-and-penetration treatment materials.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. 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 in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

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1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

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2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying 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 Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with 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. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber plywood is to be tested in accordance with ASTM D5516 and design value adjustment factors are to be calculated in accordance with ASTM D6305. Span ratings after treatment are to be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to **170 deg F** are to be not less than span ratings specified.
- C. 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.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

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E. Application: Treat plywood indicated on Drawings, and the following:

1. Roof and wall sheathing within **48 inches** of fire or party walls.
2. Roof sheathing.
3. Subflooring and underlayment for raised platforms.

2.5 WALL SHEATHING

A. Plywood Sheathing, Walls: , Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than **3/8 inch** .

B. Oriented-Strand-Board Sheathing, Walls: DOC PS 2, Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 32/16.
2. Nominal Thickness: Not less than **3/8 inch** .

C. Paper-Surfaced Gypsum Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.

1. Type and Thickness: Regular, **1/2 inch** or Type X, **5/8 inch** thick, as required.
2. Edge and End Configuration: Square.

2.6 ROOF SHEATHING

A. Plywood Sheathing, Roofs: , Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 24/0 .
2. Nominal Thickness: Not less than **1/2 inch**.

B. Oriented-Strand-Board Sheathing, Roofs: DOC PS 2, Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 24/0 .
2. Nominal Thickness: Not less than **5/8 inch** .

2.7 PARAPET SHEATHING

A. Plywood Sheathing, Parapets: , Exposure 1, Structural I sheathing.

1. Span Rating: Not less than 32/16 .
2. Nominal Thickness: Not less than **15/32 inch** .

B. Oriented-Strand-Board Sheathing, Parapets: DOC PS 2, Exposure 1, Structural I sheathing.

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1. Span Rating: Not less than 32/16 .
2. Nominal Thickness: Not less than 15/32 inch .

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. For roof parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M .
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

2.9 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Paper-Surfaced and Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

2.10 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

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:

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1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 2. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

- 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. Fastening Methods: Fasten panels as indicated below:
1. Combination Subfloor-Underlayment:
 - a. Glue and nail to wood framing.
 - b. Space panels **1/8 inch** apart at edges and ends.
 2. Subflooring:
 - a. Glue and nail to wood framing.
 - b. Space panels **1/8 inch** apart at edges and ends.
 3. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Space panels **1/8 inch** apart at edges and ends.
 4. Underlayment:
 - a. Nail or staple to subflooring.
 - b. Space panels **1/32 inch** apart at edges and ends.
 - c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 INSTALLATION OF GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to wood framing with nails or screws.

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2. Install panels with a **3/8-inch** gap where non-load-bearing construction abuts structural elements.
 3. Install panels with a **1/4-inch** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately **8 inches** o.c. and set back a minimum of **3/8 inch** from edges and ends of panels, unless indicated otherwise.
- D. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

3.4 INSTALLATION OF CEMENTITIOUS BACKER UNITS

- A. Install panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

END OF SECTION 06 16 00

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SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.

1.2 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification from treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.

B. Sustainable Design Submittals:

1. [Chain-of-Custody Certificates](#): For certified wood products. Include statement of costs.
2. [Chain-of-Custody Qualification Data](#): For manufacturer and vendor.

C. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.

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3. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 5. Show splice details and bearing details.
- D. Delegated Design Submittals: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation licensed in the same state as the project.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer professional engineer and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 1. Metal-plate connectors.
 2. Metal truss accessories.

1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction and is certified for chain of custody by an FSC-accredited certification body.
- C. Certified Wood: Provide an invoice including vendor's chain-of-custody number, product cost, and entity being invoiced.
- D. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- C. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
- D. Certified Wood: Certify wood products as "FSC Pure" or "FSC Mixed Credit" in accordance with FSC STD-01-001 and FSC STD-40-004.

2.2 WOOD PRODUCTS

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (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, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Provide dressed lumber, S4S.
 - 4. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

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2.3 METAL CONNECTOR PLATES

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Alpine, a division of ITW Inc.
 2. Eagle Metal Products.
 3. MiTek Industries, Inc.
- B. Fabricate connector plates to comply with TPI 1.
- C. Hot-Dip 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); **G60** coating designation; and not less than **0.036 inch** thick.
1. Use for interior locations unless otherwise indicated.

2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, 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.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Simpson Strong-Tie Co., Inc.
- B. Allowable design loads, as published by manufacturer, are to comply with or exceed those of products of manufacturers listed. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- C. 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.

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- D. Truss Tie-Downs: As indicated.
- E. Roof Truss Clips: As indicated.
- F. Floor Truss Hangers: As indicated.
- G. Drag Strut Connectors: As indicated.
- H. Drag Strut Connectors: Angle clip with one leg extended for fastening to the side of girder truss.
 - 1. Angle clip is 3 by 3 by 0.179 by 8 inches with extended leg 8 inches long. Connector has galvanized finish.
 - 2. Angle clip is 3 by 3 by 0.239 by 10-1/2 inches with extended leg 10-1/2 inches long. Connector has painted finish.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

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- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- H. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
- I. Install wood trusses within installation tolerances in TPI 1.
- J. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- K. Replace wood trusses that are damaged or do not comply with requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces in accordance with ASTM A780/A780M and manufacturer's written instructions.

END OF SECTION 06 17 53

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SECTION 06 60 00 – PVC PANELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Plastic wall liner panels.
- B. Plastic ceiling panels.

1.2 REFERENCES

- A. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM D4226- Standard Test Method for Impact Resistance
- C. ASTM G21- Standard Test Method Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- D. City of Los Angeles Research Report: RR 26036

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Submit plan, section and elevation drawings to depict the actual construction of each unit type specified, and to depict proper attachment and installation techniques. Coordinate locations with those indicated on the contract drawings.
- D. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Primary products shall be manufactured and supplied by a single manufacturer.

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- B. Installer Qualifications: Products shall be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Store panels flat.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. Panels should be installed at temperatures that are within 40F degrees of operating temperature
- B. Cold Temperatures – Do NOT install panels at temperature at or below 32F degrees.

1.7 WARRANTY

- A. At project closeout, provide to Owner or Owner's Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.
 - 1. Term: Limited Lifetime.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
1. Trusscore, Inc. Located at: 140 Minto Road Palmerston, ON N0G2P0 Phone: (888) 418-4679 Fax: (866) 457-9859
 2. Or approved equal if and as specifically approved by Architect by Addendum during the bidding period.

2.2 PVC CEILING PANELS

- A. Basis of Design Product: Trusscore® Wall&CeilingBoard™ PVC Interlocking Liner Panel
3. Description: Tongue-and-groove, rib-reinforced wall panels with nailing fins.
 4. Material: PVC
 5. Outside Surface: Flat.
 6. Width: 16"
 7. Thickness: 1/2 inch.
 8. Weight: 0.8 pounds per square foot
 9. Food processing facilities: CFIA approved and compliant with FDA and USDA guidelines.
 10. Surface Burning Characteristics, ASTM E 84: Class A
 - a. Flame Spread Index: 10.
 - b. Smoke Developed Index: 400.
 11. Color: White
 12. Corrosion proof
 13. Waterproof, Nonporous

2.3 ACCESSORIES

- A. Product: Trusscore® PVC Trim
1. Description: J Trim, Outside Corner, Inside Cove, Base Trim, H Divider and F Channel.
 2. Material: PVC, 100 percent virgin
 3. Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install wall and ceiling panels in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install wall and ceiling panels plumb, level, square, flat, and in proper alignment.
- C. Install trim in accordance with manufacturer's instructions.
- D. Ceiling Panels: Anchor ceiling panels with fasteners in accordance with manufacturer's instructions.
- E. Wall Panels: Anchor wall panels with construction adhesive and fasteners in accordance with manufacturer's instructions.
- F. Fasteners:
 - 1. Fastening into Wood or Metal: Stainless Steel or Zinc coated, 1 inch, No. 10 pancake head screw.
 - 2. Fastening into Masonry: Stainless steel, Tapcon 3/16-inch x 1-1/4 inch screws.
 - 3. Install fasteners in pre-punched holes 16 inches to 24 inches (406mm 610mm) on center into screw flange.
 - 4. Ensure screw flange lays flat against surface, between screw head and substrate, not deformed around screw heads.
 - 5. Do not recess screw heads into nailing fins.
 - 6. Ensure fasteners are not exposed.
 - 7. Staples: Do not use.
- G. Cutting Panels:
 - 1. Field-cut panels as necessary in accordance with manufacturer's instructions.
 - 2. Ensure cuts are straight, square, and do not damage panels.

3.4 CLEANING AND ADJUSTMENT

- A. Clean with a mild detergent or soap scum remover.

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- B. Where detergents do not work, low pressure washers with mild soap and a soft cloth may be used.
- C. Multi-purpose cleaners may be used, provided they are PVC compatible. Spot test material in an inconspicuous location prior to cleaning.
- D. Do not use abrasive cleaners.
- E. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- F. Where damage cannot be repaired, remove and replace damaged Work in accordance with manufacturer's instructions.

3.5 PROTECTION

- A. Protect installed products until completion of project.

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SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

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. Cold-applied, emulsified-asphalt dampproofing.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for bituminous vapor retarders.
 - 2. Section 04 22 00 "Concrete Unit Masonry" for mortar parge coat on masonry surfaces.
 - 3. Section 07 13 26 "Self-Adhering Sheet Waterproofing" for waterproofing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 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.

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PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide molded-sheet drainage panels and auxiliary materials recommended in writing by manufacturer of primary materials.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
 - 2. Henry Company.
 - 3. Karnak Corporation.
 - 4. Meadows, W. R., Inc.
 - 5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- E. VOC Content: 30 g/L or less.
- F. Low-Emitting Materials: Dampproofing shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 AUXILIARY MATERIALS

- A. General: 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.
 - 1. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

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- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.
- E. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on both sides with plastic film, nominal thickness 1/4 inch (6 mm), with a compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.
- F. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core; and with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Hydrotech, Inc.
 - b. Carlisle Coatings & Waterproofing Inc.
 - c. Grace, W. R., & Co. - Conn.
 - d. Protecto Wrap Company.
 - e. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
 - 1. Test for surface moisture according to ASTM D 4263.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. 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.
- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.
- C. 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 more stringent requirements are 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 footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches (150 mm) over outside face of footing.
 - 1. Extend dampproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch-(200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch (6 mm) 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 (6 mm) onto shelf angles supporting veneer.
- D. Where dampproofing interior face of above-grade, exterior concrete and masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

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3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m) or one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
- B. Masonry Backup for Brick Veneer Assemblies, Stone Veneer Assemblies and Dimension Stone Cladding: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- C. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).
- D. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

3.5 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
 - 2. Install protection course within 24 hours of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. Install protection course before installing drainage panels.

3.7 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

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SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Modified bituminous sheet waterproofing.
 - 2. Modified bituminous sheet waterproofing, fabric reinforced.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:

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1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
2. 8-by-8-inch (200-by-200-mm) square of insulation.
3. 4-by-4-inch (100-by-100-mm) square of drainage panel.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control reports.
- C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, and molded-sheet drainage panels from single source from single manufacturer.

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2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc; VM75.
 - b. Carlisle Coatings & Waterproofing Inc; CCW MiraDRI 860/861.
 - c. Grace Construction Products; W.R. Grace & Co. -- Conn; [Bituthene 3000/Low Temperature] [or] [Bituthene 4000].
 - d. Henry Company; Blueskin WP 100/200.
 - e. Meadows, W.R.,Inc; SealTight Mel-Rol.
 - f. Protecto Wrap Company; PW 100/60.
 - g. Or equal if and as specifically approved by Architect by Addendum.
 2. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
 - g. Water Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m) maximum; ASTM E 96/E 96M, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet (60 m) minimum; ASTM D 5385.
 3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.
- B. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

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- B. Primer: Liquid primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.
- G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.

[OR]

- H. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side of the core; and with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).
 - 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. American Hydrotech, Inc; [Hydrodrain 400] [Hydrodrain 420].
 - b. Carlisle Coatings & Waterproofing Inc; [CCW MiraDRAIN 6000] [CCW MiraDRAIN 6000XL] [CCW MiraDRAIN 6200] [CCW MiraDRAIN 6200XL].
 - c. Grace Construction Products; W.R. Grace & Co. -- Conn; [Hydroduct 220] [Hydroduct? 660] [Hydroduct? Coil 600].
 - d. Grace Construction Products; W.R. Grace & Co. -- Conn; [Hydroduct 220] [Hydroduct 660].
 - e. Protecto Wrap Company; Protecto Drain 2000-V.
 - f. Meadows, W.R., Inc; Mel-Drain
 - g. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

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2.5 INSULATION

- A. Insulation, General: Comply with **[Section 07 21 00 "Thermal Insulation."]**
- B. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, shiplap edged.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning Insulating Systems LLC.
 - d. Pactiv Corporation.
 - e. T. Clear Corporation, a subsidiary of Fin Pan Inc.
 - f. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
 - 2. Type IV, 25-psi (173-kPa) minimum compressive strength.

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 waterproofing.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

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- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).
- F. Bridge and cover isolation joints, expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
 - b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-

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temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).

- D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- F. Seal edges of sheet-waterproofing terminations with mastic.
- G. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- I. Immediately install protection course with butted joints over waterproofing membrane.
 - 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.4 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install [**board insulation**] [**protection course**] before installing drainage panels.

3.5 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.
- C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

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3.6 FIELD QUALITY CONTROL

- A. Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.
- B. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches (64 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (51 mm) of clearance from top of sheet flashings.
 - 2. Flood each area for 24 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- C. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
- D. Prepare test and inspection reports.

3.7 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed board insulation from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 1. Glass-fiber blanket insulation.
 2. Mineral-wool blanket insulation.
 3. Loose-fill insulation.
 4. Radiant barriers.
 5. Vapor retarders.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Fire Resistance Ratings: As determined by testing identical products according to ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Combustion Characteristics: As determined by testing identical products according to ASTM E 136 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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1.6 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 before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation.
 - 2. Johns Manville.
 - 3. Knauf Insulation.
 - 4. Owens Corning.
 - 5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.2 MINERAL-WOOL BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fibrex Insulations Inc.
 - 2. Owens Corning.
 - 3. Roxul Inc.
 - 4. Thermafiber.
 - 5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

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- B. Unfaced, Mineral-Wool Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

2.3 LOOSE-FILL INSULATION

- A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C739, chemically treated for flame-resistance, processing, and handling characteristics.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Green Fiber
 - 2. Hamilton Manufacturing Inc.
 - 3. Nu-Wool Co., Inc.
 - 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).
- B. Foil-Polyester-Film Vapor Retarders: Two layers of 0.5-mil- (0.013-mm-) thick polyester film laminated to an inner layer of 1-mil- (0.025-mm-) thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Alumiseal Corporation; Zero Perm Vapor Barrier.
 - b. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- D. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- E. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- F. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing 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 indicated.
- 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. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical 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 36 inches (915 mm) 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 36 inches (915 mm) in from exterior walls.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in

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completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

- C. Glass-Fiber or Mineral-Wool 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 (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), 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 C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. 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 constructions.
 - b. Interior Walls: Set units with facing placed toward areas of high humidity.
- D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

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2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.6 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
 4. Install foil/polyester VB where installation is exposed in plenum.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

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3.7 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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SECTION 074113.13 - FORMED METAL ROOF PANELS

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. Exposed-fastener, lap-seam, metal roof panels.

B. Related Sections:

1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.
2. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site] <Insert location>**.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
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 metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of **[deck] [purlins and rafters]** during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.

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10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

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1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. **UL-Certified, Portable Roll-Forming Equipment:** UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- C. **Mockups:** Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof area and eave, including fascia, and soffit as shown on Drawings; approximately 48 inches (1200 mm) square by full thickness, including attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. **Weather Limitations:** Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

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1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems 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: 2 years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal 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 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. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for steep-slope roof products.
- B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.

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2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.
- C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- F. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- G. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 1. Uplift Rating: UL 90.
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 EXPOSED-FASTENER, LAP-SEAM, METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Double Rib-Profile, Exposed-Fastener Metal Roof Panels MP-1:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Berridge Manufacturing Company. Basis of design: Double-Rib Panel
 - b. CENTRIA Architectural Systems.

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- c. Fabral
- d. MBCI
- e. Morin
- f. PAC-CLAD Petersen Aluminum Corporation.
- g. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Nominal Thickness: 22ga. 0.03125 inch (0.79375 mm), with smooth surface.
- b. Exterior Finish: Two-coat fluoropolymer.
- c. Color: Match Architect's samples – Color to match 'Green' hue of red barn on adjacent site.
- d. Panel Coverage: 24 inches.
- e. Panel Height: 0.5 inch (13 mm).

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 220 deg F (111 deg C); ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

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1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.
- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch- (1.2-mm) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
1. Insulate roof curb with 1-inch- (25-mm-) thick, rigid insulation.
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- H. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

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2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations 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. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 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: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in

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same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. 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.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel 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 systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

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3.3 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF METAL ROOF PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air or water-resistive barriers and flashings that are concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

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1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
 6. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.
- F. 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. 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 sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) 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 (25 mm) deep, filled with mastic sealant (concealed within joints).
- G. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

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- H. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
 - 1. Provide elbows at base of downspouts to direct water away from building.
 - 2. Connect downspouts to underground drainage system indicated.
- I. Roof Curbs: Install flashing around bases where they meet metal roof panels.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.
- B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13.13

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SECTION 07 42 19 - INSULATED METAL WALL PANELS

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. Foamed-insulation-core metal wall panels.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.

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1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal 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. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems 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.

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- b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal 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 according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 72:
 1. Wind Loads: As indicated on Drawings. Minimum wind pressure rating of 60 psf
 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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- F. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
 2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
 3. Radiant Heat Exposure: No ignition when tested according to NFPA 268.
 4. Potential Heat: Acceptable level when tested according to NFPA 259.
 5. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E 84.

2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
1. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
 - a. Closed-Cell Content: 90 percent when tested according to ASTM D 6226.
 - b. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D 1622.
 - c. Compressive Strength: Minimum 20 psi (140 kPa) when tested according to ASTM D 1621.
 - d. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C 273/C 273M.
- B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
1. Basis of Design: MBCI, CF FLUTE
 - a. G-90 galvanized coated steel conforming to ASTM A 653 and/or AZ50 aluminum-zinc alloy coated steel, conforming to ASTM A 792/A 792M, minimum grade 33, prepainted by the coil-coating process per ASTM A 755/A 755M.
 - b. Exterior Face Sheet: 24 gauge thickness, with smooth surface.
 - 1) Finish: Fluoropolymer two-coat system
 - 2) Color: Match Architect's samples – Color to match 'White' hue of barn on adjacent site.

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- c. Interior Face Sheet: 24 gauge thickness, with stucco embossed surface and planked profile.
 - 1) Finish: Modified silicone-polyester two-coat system
 - 2) Color: Selected from manufacturer's standard colors
 - d. Panel Width: 42 inches
 - e. Panel Thickness: 3 inch.
 - f. Insulating Core: Mineral Wool
 - g. Panel Attachment - Through-fastened flush, double tongue-and-groove connection of the metal faces with an advanced integral spine to join the mineral wool core
 - h. Compressive Strength: As required to meet structural performance requirements and with a minimum of 15 psi as determined by ASTM D 1621
 - i. Minimum Density: 2.0 pcf (32 kg/m³) as determined by ASTM D 1622
 - j. Thermal Resistance R-Value: 10.8 deg. F * hr * sq. ft./Btu as determined by ASTM C 518 at 75 degrees Fahrenheit mean temperature.
2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.028 inch (0.71 mm).
 - b. Exterior Finish: Three-coat fluoropolymer.
 - 1) Color: As selected by Architect from manufacturer's full range.
 3. Panel Coverage: As indicated on drawings.
 4. Panel Thickness: As indicated on drawings..

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure

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strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- C. Flashing and Trim: Provide flashing and trim formed from same material as metal 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, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations 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. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

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4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel 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: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel 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 metal wall panel manufacturer.

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2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel 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 systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 2. 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.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

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- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.
1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSULATED METAL WALL PANEL INSTALLATION

- A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
 2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
 4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
 6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
 7. Apply snap-on battens to exposed-fastener, insulated-core metal wall panel seams to conceal fasteners.
- B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
1. Install clips to supports with self-tapping fasteners.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners

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where possible, and set units true to line and level. 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 sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) 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 (25 mm) deep, filled with mastic sealant (concealed within joints).

3.5 FIELD QUALITY CONTROL

- A. Water-Spray Test: After installation, test area of assembly for water penetration according to AAMA 501.2.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- C. Metal wall panels will be considered defective if they do not pass test and inspections.
- D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 19

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SECTION 07 42 93 – SOFFIT PANELS

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. Metal soffit panels.
- B. Related Sections:
 - 1. Section 074113.13 "Formed Metal Roof Panels" for lap-seam metal roof panels.

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 each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

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1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof eave, including fascia, and soffit as shown on Drawings; approximately four panels wide by full eave width, including attachments and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

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- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems 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. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal 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 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: 10 years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile Metal Soffit Panels SV-1: Perforated panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Berridge Manufacturing Company. Basis of design: Double-Rib Panel
 - b. CENTRIA Architectural Systems.
 - c. Fabral
 - d. MBCI
 - e. Morin

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- f. PAC-CLAD Petersen Aluminum Corporation.
- g. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
2. Material: Same material, finish, and color as metal roof panels.
3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 22ga. 0.03125 inch (0.79375 mm), with smooth surface.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Match Architect's samples – Color to match 'Green' hue of red barn on adjacent site.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

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2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations 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. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

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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: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
 - 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
 - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

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3.3 INSTALLATION

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

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- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

- G. 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 sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Manufactured through-wall flashing with counterflashing.
2. Manufactured reglets with counterflashing.
3. Formed roof-drainage sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.
6. Formed equipment support flashing.
7. Formed overhead-piping safety pans.

- B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 07 72 00 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.

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3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile.
2. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
3. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.

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- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including built-in gutter, fascia, fascia trim, apron flashing where applicable, approximately 4 feet (3.0 m) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

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1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. SPRI Wind Design Standard: Manufacture and install **[copings]** **[roof edge flashings]** tested according to SPRI ES-1 and capable of resisting the following design pressure:
1. Design Pressure: As indicated on Drawings.
- E. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[25]** **<Insert number>** percent.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M.
1. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. 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.
 3. Color: Match Architect's sample.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
1. Products: Subject to compliance with requirements, **provide one of the following**:
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
 - e. Metal-Fab Manufacturing, LLC; MetShield.
 - f. Owens Corning; WeatherLock Specialty Tile & Metal Underlayment.
 - g. Polyguard Products, Inc.; Deck Guard HT.
 - h. Protecto Wrap Company; Protecto Jiffy Seal Ice & Water Guard HT.
 - i. SDP Advanced Polymer Products Inc; Palisade SA-HT.
 - j. **<Insert manufacturer's name; product name or designation>**.
 2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
 3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

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- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric [**polyurethane**] [**polysulfide**] [**silicone**] polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall, Ribbed, Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry, with ribs at 3-inch (75-mm) intervals along length of flashing to provide integral mortar bond. Manufacture through-wall flashing with interlocking counterflashing on exterior face, of same metal as flashing.

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1. Stainless Steel: **[0.016 inch (0.40 mm)] <Insert dimension>** thick.

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

- 1) Cheney Flashing Company; Cheney Flashing
- 2) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
- 3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
- 4) Sandell Manufacturing; Pre-Formed Metal Flashing.

B. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated [with factory-mitered and -welded corners and junction and with interlocking counterflashing on exterior face, of same metal as reglet.

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

- a. Cheney Flashing Company.
- b. Fry Reglet Corporation.
- c. Heckmann Building Products, Inc.
- d. Hickman, W. P. Company.
- e. Hohmann & Barnard, Inc.
- f. Keystone Flashing Company, Inc.
- g. National Sheet Metal Systems, Inc.
- h. Sandell Manufacturing.

2. Material: Galvanized steel, 0.022 inch (0.56 mm) thick.

3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

7. Accessories:

- a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
- b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

8. Finish: With manufacturer's standard color coating.

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2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.

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2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
1. Gutter Profile: Style B according to cited sheet metal standard.
 2. Expansion Joints: **Built in.**
 3. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen, Wire-ball downspout strainer, Valley baffles.
 4. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
 - a. Galvanized Steel: **[0.022 inch (0.56 mm)] <Insert dimension>** thick.
 - b. Aluminum-Zinc Alloy-Coated Steel: **[0.022 inch (0.56 mm)] <Insert dimension>** thick.
- B. Downspouts: Fabricate downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.
1. Fabricated Hanger Style: [Fig 1-35A] [Fig 1-35B] [Fig 1-35C] [Fig 1-35D] [Fig 1-35E] [Fig 1-35F] [Fig 1-35G] [Fig 1-35H] [Fig 1-35I] [Fig 1-35J] according to SMACNA's "Architectural Sheet Metal Manual."
 2. Manufactured Hanger Style: [Fig 1-34A] [Fig 1-34B] [Fig 1-34C] [Fig 1-34D] [Fig 1-34E] according to SMACNA's "Architectural Sheet Metal Manual."
 3. Hanger Style:
 4. Fabricate from the following materials:
 - a. Aluminum: 0.024 inch (0.61 mm).
 - b. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - c. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, built-in overflows. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 3. Galvanized Steel: 0.028 inch (0.71 mm)]thick.
- D. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Aluminum: [0.040 inch (1.02 mm)] thick.
 2. Stainless Steel: [0.019 inch (0.48 mm)] thick.

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2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.
 4. .
- B. Valley Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 2. Galvanized Steel: 0.028 inch (0.71 mm) thick.
 3. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
- C. Drip Edges: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.019 inch (0.48 mm) thick.
 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- F. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 2. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.9 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.016 inch (0.40 mm) thick.

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- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - 3. Galvanized Steel: 0.022 inch (0.56 mm) thick.

- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
 - 1. Aluminum: 0.040 inch (1.02 mm) thick.
 - 2. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 3. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 2. Galvanized Steel: 0.028 inch (0.71 mm) thick.

- B. Overhead-Piping Safety Pans: Fabricate from the following materials:
 - 1. Stainless Steel: 0.025 inch (0.64 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

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- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- D. Apply slip sheet, wrinkle free, **[over underlayment] [directly on substrate] <Insert requirement>** before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of **10 feet (3 m)]** with no joints within 24 inches (600 mm) of corner or intersection.

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1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in **uncoated** aluminum or zinc where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
 2. Anchor and loosely lock back edge of gutter to continuous cleat, eave or apron flashing.
 3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 4. Anchor gutter with gutter brackets spaced not more than 24 inches (600 mm) apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
 5. Anchor gutter with spikes and ferrules spaced not more than 24 inches (**600 mm**) apart.
 6. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
 7. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.

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1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
 2. Provide elbows at base of downspout to direct water away from building.
 3. Connect downspouts to underground drainage system.
- D. Splash Pans: Install where downspouts discharge.
- E. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below gutter discharge.
- F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- D. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.
- E. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- F. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- G. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

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- H. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with **elastomeric** sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."
- C. Reglets: Installation of reglets is specified in Section 042000 "Unit Masonry."
- D. Opening Flashings in Frame Construction: Install continuous head, sill, **jamb**, and similar flashings to extend **4 inches (100 mm)** beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

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- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

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SECTION 077100 - ROOF SPECIALTIES

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. Copings.
- 2. Roof-edge specialties.
- 3. Roof-edge drainage systems.
- 4. Reglets and counterflashings.

- B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
- 2. Section 074113.13 "Formed Metal Roof Panels" for roof-edge drainage-system components provided by metal-roof-panel manufacturer.
- 3. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
- 4. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
- 5. Section 077253 "Snow Guards" for manufactured snow guard devices.
- 6. 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, Architect, Owner's insurer if applicable, 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.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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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 each type of roof specialty and for each color and texture specified.
- D. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.
- E. Samples for Verification:
1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
 2. Include roof-edge specialties, roof-edge drainage systems, reglets and counterflashings, made from 12-inch (300-mm) lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For manufacturer.
 - B. Product Certificates: For each type of roof specialty.
 - C. Product Test Reports: For roof-edge flashings, for tests performed by a qualified testing agency.
 - D. Sample Warranty: For manufacturer's special warranty.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For roofing specialties to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

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- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 074113.13 "Formed Metal Roof Panels"

1.7 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.

1.8 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.

1.9 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 074113.13 "Formed Metal Roof Panels".
- B. 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 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall 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.

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- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. FM Approvals' Listing: Manufacture and install copings, roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.
- D. SPRI Wind Design Standard: Manufacture and install copings roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - 1. Design Pressure: As indicated on Drawings.
- E. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 ROOF-EDGE SPECIALTIES

- A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hickman Company, W. P.
 - b. Metal-Era, Inc.
 - c. Metal-Fab Manufacturing, LLC.
 - d. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
 - e. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
 - 2. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal 0.028-inch (0.71-mm) thickness.
 - a. Surface: Smooth, flat finish.
 - b. Finish: Two-coat fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's full range.

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2.3 ROOF-EDGE DRAINAGE SYSTEMS

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

1. Architectural Products Company.
2. ATAS International, Inc.
3. Berger Building Products, Inc.
4. Castle Metal Products.
5. Cheney Flashing Company.
6. CopperCraft by FABRAL; a Euramax company.
7. Hickman Company, W. P.
8. Merchant & Evans, Inc.
9. Metal-Era, Inc.
10. Metal-Fab Manufacturing, LLC.
11. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
12. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.

C. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.

D. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

E. Aluminum Finish: Two-coat fluoropolymer

1. Color: As selected by Architect from manufacturer's full range.

F. Stainless-Steel Finish: No. 4 (bright, polished directional satin).

G. Copper Finish: Non-patinated, mill.

2.4 REGLETS AND COUNTERFLASHINGS

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

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1. Castle Metal Products.
 2. Cheney Flashing Company.
 3. Fry Reglet Corporation.
 4. Heckmann Building Products Inc.
 5. Hickman Company, W. P.
 6. Keystone Flashing Company, Inc.
 7. Metal-Era, Inc.
 8. Metal-Fab Manufacturing, LLC.
 9. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.
 2. Formed Aluminum: 0.050 inch (1.27 mm) thick.
 3. Stainless Steel: 0.019 inch (0.48 mm) thick.
 4. Corners: Factory mitered and continuously welded.
 5. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 6. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 7. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 8. 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 (100 mm) and in lengths not exceeding 12 feet (3.6 m) 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: 0.032 inch (0.81 mm) thick.
 2. Stainless Steel: 0.019 inch (0.48 mm) 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. Zinc-Coated Steel Finish: Two-coat fluoropolymer.
1. Color: As selected by Architect from manufacturer's full range.

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2.5 MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
- D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.6 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F (116 deg C).
 - 2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F (29 deg C).
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; [Grace Ice and Water Shield HT] [Ultra].
 - c. Henry Company; Blueskin PE200 HT.
 - d. Metal-Fab Manufacturing, LLC; MetShield.
 - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
 - f. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

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.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
- B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

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- C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Coil-Coated Galvanized-Steel Sheet Finishes:
 - 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A 755/A 755M and coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 621. 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.
 - 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 (0.013 mm).
- E. 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 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.
- F. Aluminum Extrusion 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 [2604] [2605]. 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.

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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 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply continuously under copings, roof-edge specialties, and reglets and counterflashings.
 - 2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

3.3 INSTALLATION, GENERAL

- A. General: 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.

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1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of self-adhering, high-temperature sheet underlayment.
 3. 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 (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. 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 elastomeric 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 (4 deg C).
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- 3.4 COPING INSTALLATION
- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
1. Interlock face-leg drip edge into continuous cleat anchored to substrate at 24-inch (610-mm) centers. Anchor back leg of coping with screw fasteners and elastomeric washers at 24-inch (610-mm) centers.

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3.5 ROOF-EDGE SPECIALITIES INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.6 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and solder to make watertight. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
 - 1. Provide elbows at base of downspouts at grade to direct water away from building.
 - 2. Connect downspouts to underground drainage system indicated.
- D. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below gutter discharge.

3.7 REGLET AND COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Embedded Reglets: See Section 042000 "Unit Masonry" for installation of reglets.
- C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.
- D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

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3.8 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 07 71 00

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SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment supports.
 - 2. Hatch-type heat and smoke vents.
 - 3. Dropout-type heat and smoke vents.
 - 4. Gravity ventilators.
 - 5. Pipe supports.
 - 6. Preformed flashing sleeves.
- B. Related Sections:
 - 1. Section 074113.13 "Formed Metal Roof Panels" for shop- and field-formed roof curbs and snow guards for sheet metal roofing.
 - 2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
 - 3. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
 - 4. Section 077253 "Snow Guards" for snow guards.
 - 5. Section 233423 "HVAC Power Ventilators" for power roof-mounted ventilators.
 - 6. Section 283111 "Digital, Addressable Fire-Alarm System" for interconnects to automatically operated heat and smoke vents.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

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- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 - 4. Required clearances.
- B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 COORDINATION

- A. Coordinate layout and installation of roof accessories with interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.8 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories 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 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

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2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation and mill phosphatized for field painting where indicated.
 1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
 3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 4. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 (AZM150) coated.
 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
 2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat.

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- Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
1. Mill Finish: As manufactured.
 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
 3. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
 4. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
 5. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 7. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).
- D. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- E. Copper Sheet: ASTM B 370, manufacturer's standard temper.
- F. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- G. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- H. Steel Tube: ASTM A 500, round tube.
- I. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- J. Steel Pipe: ASTM A 53/A 53M, galvanized.

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2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.
- C. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.
- D. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.
- E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Underlayment:
 - 1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.
- H. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
 - 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- I. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- J. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- K. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- L. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

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2.3 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.

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3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- E. Heat and Smoke Vent Installation:
 1. Install heat and smoke vent so top perimeter surfaces are level.
 2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.
- F. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.
- G. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.
- H. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.
- I. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.
- J. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

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SECTION 07 72 53 - SNOW GUARDS

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. Pad-type, flat-mounted snow guards.

1.3 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for snow guards.
- B. Shop Drawings: Include roof plans showing layouts and attachment details of snow guards.
 - 1. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacings, and finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of snow guard, for tests performed by manufacturer and witnessed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Provide snow guards that withstand exposure to weather and resist thermally induced movement without failure, rattling, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

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B. Structural Performance:

1. Snow Loads: As indicated on Drawings.

2.2 PAD-TYPE SNOW GUARDS

A. Flat-Mounted Metal Snow Guard Pads:

1. Material: Manufacturer's standard noncorrosive metal.
2. Finish and Color: Powder coat; Color to match metal roofing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, snow guard attachment, and other conditions affecting performance of the Work.
 1. Verify compatibility with and suitability of substrates including compatibility with existing finishes or primers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare substrates for bonding snow guards.
- B. Prime substrates according to snow guard manufacturer's written instructions.

3.3 INSTALLATION

- A. Install snow guards according to manufacturer's written instructions. Space rows as recommended by manufacturer.
- B. Attachment for Standing-Seam Metal Roofing:
 1. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.

END OF SECTION 07 72 53

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SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

- B. Related Requirements:

1. Section 07 92 19 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.

- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

- B. Sample Warranties: For special warranties.

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1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 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: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

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PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
 - 1. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.
- B. Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic-and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T and NT
- C. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic-and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50 NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; 890FTS/TXTR.

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2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; 898NST.

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330. As approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 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.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 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

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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. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
 - 2. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

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3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Sealant: Urethane T..
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Joints in exterior insulation and finish systems.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
 - e. Control and expansion joints in ceilings, and other overhead surfaces.
 - f. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane 50 NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. 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. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
 - d. Joints on underside of plant-precast structural concrete.
 - e. All vertical interior urethane resisting joints.
 2. Joint Sealant: Urethane, NS, 50, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
 - a. All interior joints not otherwise indicated.

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2. Joint Sealant: Acrylic 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 Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 2. Joint Sealant: Silicone, mildew resistant.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

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SECTION 08 11 19 - STAINLESS STEEL HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section include:
 - 1. Stainless-steel, hollow metal doors.
 - 2. Stainless-steel, hollow metal frames.
- B. Related Requirements:
 - 1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.3 COORDINATION

- A. Coordinate anchorage installation for stainless steel 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.

1.4 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 anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.

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9. Details of conduit and preparations for power, signal, and control systems.

- C. Schedule: Provide a schedule of hollow-metal work 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of stainless steel hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain stainless-steel, hollow-metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- C. Smoke- and Draft-Control Door Assemblies: At corridors, smoke barriers, and smoke partitions, provide assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies that are listed and labeled, by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite. Install in compliance with NFPA 80.
- E. Pre-installation Conference: Conduct conference at Project site.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work 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 stainless steel hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate installation of anchorages for stainless-steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 STAINLESS STEEL DOORS AND FRAMES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Steelcraft; an Ingersoll-Rand company.
 - 4. West Central Manufacturing
 - 5. Stainless Doors
 - 6. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Source Limitations: Obtain stainless steel work from single source from single manufacturer.

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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 10C.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

- A. Description: Stainless-steel doors, not less than 1-3/4 inches (44 mm) thick, of seamless, hollow-metal construction. Construct doors with smooth, flush surfaces without visible joints or seams on faces.
 - 1. Face Sheets: Fabricate from 0.078-inch- (1.98-mm-) thick, stainless-steel sheet.
 - 2. Core Construction: Fabricate doors with core indicated.
 - a. Welded Steel-Stiffened Core: vertical stiffeners extending full-door height, spaced not more than 6 inches (152 mm) apart, spot welded to face sheets a maximum of 5 inches (127 mm) o.c. Fill spaces between stiffeners with mineral-fiber insulation.
 - b. Laminated Core: foam-plastic insulation fastened to face sheets with waterproof adhesive.
 - c. Fire-Rated Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Vertical Edges for Single-Acting Doors: Beveled 1/8 inch in 2 inches (3 mm in 50 mm).
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
 - 5. Moldings for Glazed Lites in Doors: 0.038-inch- (0.95-mm-) thick stainless steel.
 - 6. Loose Stops for Glazed Lites in Doors: 0.038-inch- (0.95-mm-) thick stainless steel.
 - 7. Top and Bottom Channels: Closed with continuous channels, 0.062-inch- (1.59-mm-) thick stainless steel.
 - a. Securely fastened using adhesive.
 - 8. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.
 - 9. Electrical Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, 1/2-inch- (12.7mm-) diameter conduit and connectors.
 - a. Where indicated for installation of wiring, provide access plates to junction boxes, fabricate from same material and thickness as face sheet and fasten with at least four security fasteners spaced not more than 6 inches (152 mm) o.c.
- B. Performance: Level A, ANSI A250.4.
- C. Materials:
 - 1. Stainless-Steel Sheet: ASTM A240/A240M, austenitic stainless steel, Type 304 or 316 as indicated.
 - 2. Steel Sheet: ASTM A1008/A1008M or ASTM A1011/A1011M, Commercial Steel (CS), Type B.

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3. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
4. Foam-Plastic Insulation: Manufacturer's standard polystyrene board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84. Enclose insulation completely within door.
5. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

D. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.

2.4 STAINLESS-STEEL PANELS

- A. Provide stainless-steel panels of same construction, materials, and finish as specified for adjoining stainless-steel doors.

2.5 STAINLESS-STEEL FRAMES

- A. Description: Fabricate stainless-steel frames of construction indicated, with faces of corners mitered and contact edges closed tight.
1. Door Frames: Saw mitered and full (continuously) welded.
 - a. Weld frames according to HMMA 820.
 2. Sidelight Transom and Borrowed-Light Frames: Saw mitered and full (continuously) welded.
 3. Door Frames for Openings 48 Inches (1219 mm) Wide or Less: Fabricate from 0.078-inch- (1.98-mm-) 0.109-inch- (2.78-mm-) thick, stainless-steel sheet.
 4. Door Frames for Openings More Than 48 Inches (1219 mm) Wide: Fabricate from 0.109-inch- (2.78-mm-) thick, stainless-steel sheet.
 5. Borrowed-Light Frames: Fabricate from 0.078-inch- (1.98-mm-) thick, stainless-steel sheet.
 6. Sidelight and Transom Frames: Fabricate from stainless-steel sheet of same thickness as adjacent door frame.
 7. Glazing and Panel Stops: Formed integral with stainless-steel frames, minimum 5/8 inch (16 mm) high, unless otherwise indicated.
 8. Loose Stops for Glazed Lites and Panels: 0.038-inch- (0.95-mm-) thick stainless steel.
 9. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless steel.
 10. Head Reinforcement: 0.109-inch- (2.78-mm-) thick, stainless-steel channel or angle stiffener for openings widths more than 48 inches (1219 mm).

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11. Jamb Anchors:

- a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.062-inch- (1.59-mm-) thick stainless steel with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.156 inch (4.0 mm) thick.
- b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.050-inch- (1.27-mm-) thick stainless steel.
- c. Compression Type for Slip-on Frames: Fabricate adjustable compression anchors from stainless steel.
- d. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8inch- (9.5-mm-) diameter, stainless-steel bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

12. Floor Anchors: Not less than 0.078-inch- (1.98-mm-) thick stainless steel, and as follows:

- a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

13. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- (9.5-mm-thick by 50-mm-) wide from stainless steel.

14. Plaster Guards: Not less than 0.019-inch- (0.48-mm-) thick stainless steel. B. Performance: Level A, ANSI A250.4.

C. Materials:

1. Stainless-Steel Sheet: ASTM A240/A240M, austenitic stainless steel, Type 304 or 316 as indicated.
2. Steel Sheet: ASTM A1008/A1008M or ASTM A1011/A1011M, Commercial Steel (CS), Type B.
3. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
4. Frame Anchors: Stainless-steel sheet. Same type as door face.
5. Frame Anchors: Steel sheet, hot-dip galvanized according to ASTM A153/A153M, Class B.
6. Inserts, Bolts, and Anchor Fasteners: Stainless-steel components complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Alloy Group 1 or 4) for bolts and nuts.
7. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329. D. Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

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2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.

2.6 ACCESSORIES

- A. Glazing: Comply with requirements in Section 08 80 00 "Glazing."
- B. Grout: Comply with ASTM C476, with a slump of not more than 4 inches (102 mm) as measured according to ASTM C143/C143M.
- C. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- D. Mineral Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

2.7 FABRICATION

- A. Stainless-Steel Door Fabrication: Stainless-steel doors to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 1. Seamed Edge Construction: Both vertical door edges joined by visible, continuous interlocking seam (lock seam) full height of door.
 2. Seamed Edge Construction: Both vertical door edges joined by visible seam that is projection, spot, or tack welded on inside edges of door at minimum 6 inches (152 mm) o.c.
 3. Seamless Edge Construction: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
 4. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
 5. Stops and Moldings: Factory cut openings in doors. Provide stops and moldings around glazed lites. Form corners of stops and moldings with butted or mitered hairline joints.
 - a. Glazed Lites: Provide fixed stops and moldings welded on secure side of door.
 - b. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
 6. Hardware Preparation: Factory prepare stainless-steel doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping,

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- according to the Door Hardware Schedule and templates furnished as specified in Section 087100 "Door Hardware."
- a. Reinforce doors to receive non-templated mortised and surface-mounted door hardware.
7. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
 8. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 866.
- B. **Stainless-Steel Frame Fabrication:** Fabricate stainless-steel frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
 2. Mullions Rails and Transom Bars: Provide closed tubular members with no visible face seams or joints. Fasten members at crossings and to jambs by butt welding according to joint designs in HMMA 820.
 - a. Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
 3. Provide countersunk, flat-, or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches (1524 mm) in height.
 - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
 - 3) Four anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 96 inches (2438 mm) in height.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) in height.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
 - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof more than 96 inches (2438 mm) in height.
 - 5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.

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- d. Post-installed Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
6. Head Reinforcement: For frames more than 48 inches (1219 mm) wide, provide continuous head reinforcement for full width of opening, welded to back of frame at head.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Provide plastic plugs to 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.
8. Stops and Moldings: Provide stops and moldings around glazed lites and solid panels where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - a. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 - b. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each lite is capable of being removed independently.
 - c. Coordinate rabbet width between fixed and removable stops with type of glazing or panel and type of installation indicated.
9. Hardware Preparation: Factory prepare stainless-steel frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 087100 "Door Hardware."
 - a. Reinforce frames to receive non-templated mortised and surface-mounted door hardware.
 - b. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
10. Plaster Guards: Weld guards to frame at back of hardware mortises and mounting holes in frames to be grouted.
11. Tolerances: Fabricate frames to tolerances indicated in ANSI/NAAMM-HMMA 866.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace stainlesssteel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install stainless steel hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with NAAMM-HMMA 866 as required by standards specified.
 - 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 frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

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- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Grout jamb members full.
4. 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.
5. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Stainless-Steel Doors: Fit stainless-steel doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
 - b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
 - c. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).
 - d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.
 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

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- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Stainless-Steel Touchup: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

END OF SECTION 08 11 13

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SECTION 081613 - FIBERGLASS DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass doors.
- B. Stainless steel door frames for fiberglass doors.
- C. Door hardware for sliding doors.

1.2 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware: Door hardware for swinging doors.

1.3 REFERENCE STANDARDS

- A. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023c.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
- C. Shop Drawings: Indicate layout and profiles; include assembly methods.
 - 1. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
 - 2. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.
- D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- E. Manufacturer's qualification statement.

1.5 QUALITY ASSURANCE

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- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
 - 1. Store at temperature and humidity conditions recommended by manufacturer.
 - 2. Do not use non-vented plastic or canvas shelters.
 - 3. Immediately remove wet wrappers.
- C. Store in position recommended by manufacturer, elevated minimum 4 inches (100 mm) above grade, with minimum 1/4 inch (6 mm) space between doors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Molded Cleanroom Fiberglass Doors:
 - 1. ASI Doors Inc; _____: www.asidoors.com/#sle.
 - 2. Chase Industries, Inc..

2.2 DOOR AND FRAME ASSEMBLIES

- A. Door and Frame Assemblies: Factory-fabricated, prepared and machined for hardware.
 - 1. Operation: Manual.
 - 2. Screw-Holding Capacity: Tested to 890 pounds (404 kg), minimum.
 - 3. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
 - 4. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
 - 5. Clearance Between Door and Frame: 1/8 inch (3 mm), maximum.
 - 6. Clearance Between Bottom of Door and Finished Floor: 3/4 inch (19 mm), maximum; not less than 1/4 inch (6 mm) clearance to threshold.

2.3 COMPONENTS

- A. Doors: Fiberglass construction with reinforced core.
 - 1. Type: As indicated on drawings, including swinging and sliding doors.

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2. Thickness: 1-3/4 inch (44 mm), nominal.
3. Core Material: Manufacturer's standard core material for application indicated.
4. Construction:
 - a. Molded fiberglass shells with color gel coating, bonded into seamless unit; manufacturer's standard subframe and hardware reinforcements. 1) Fill door panel with foam insulation.
5. Face Sheet Texture: Smooth.
6. Door Panel Configuration: As indicated on drawings.
7. Subframe and Reinforcements: Manufacturer's standard materials.
8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.
9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.

B. Door Frames: Provide type in compliance with performance requirements specified for doors.

1. Type: Face welded and polished.
2. Non-Fire-Rated:
 - a. Stainless steel, Type 304; 18 gauge, 0.05 inch (1.2 mm) minimum thickness; No.4 satin brushed finish.

2.4 PERFORMANCE REQUIREMENTS

A. Provide door assemblies that have been designed and fabricated in compliance with specified performance requirements.

2.5 HARDWARE

A. Door Hardware for swinging doors: See Section 087100.

B. Door Hardware for sliding doors: Manufacturer's standard.

1. Sliding Doors Hardware:
 - a. Overhead Support Track: Manufacturer's standard, designed to keep door panel or panels off floor surface in open position.
 - 1) Provide sloped track to move panels into place while closing.
 - 2) Provide "hold-open" feature in fully open position.
 - 3) Construction: Stainless steel components and fasteners. 4) Enclosure: Manufacturer's standard, with sloped top.
 - b. Wheel Assembly: Self-aligning with permanently lubricated thermoplastic wheels.

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- c. Stay Rollers: Manufacturer's standard, floor mounted, designed to guide door panel or panels and enable complete trailing perimeter sealing under both negative and positive pressures.
- d. Gasketing: The sides, head and sill of the door are to be gasketed with a non-marking vinyl or rubber blade type gasket, capable of holding a seal under positive or negative pressure.
- e. Hardware to include Stainless Steel surface mounted pull handle with lock on sliding doors; Rockwood C-shaped pull handle or equal. Oversize door so that with pull handle installed, opening of 4'-0" can be maintained.

2.6 ACCESSORIES

- A. Door Vision Lite Frames: Frames with glazing securely fastened within door opening.
 - 1. Size: As indicated on drawings.
 - 2. Frame Material: 18 gauge, 0.0478 inch (1.21 mm), stainless steel.
 - 3. Glazing: 1/4 inch (6 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Clean and prepare substrate in accordance with manufacturer's directions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.
- B. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances; anchor in place.
- C. Separate aluminum and other metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

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3.4 ADJUSTING

- A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.
- B. Adjust hardware for smooth and quiet operation.
- C. Adjust doors to fit snugly and close without sticking or binding.

3.5 CLEANING

- A. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

3.6 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 081613

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SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

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2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Basis of Design: Best Access Doors: BA-AHD-22-36
 2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 3. Larsen's Manufacturing Company.
 4. Milcor Inc.
 5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Access Doors with Flanges AP-1:
1. Assembly Description: Fabricate door to fit flush to frame.
 2. Locations: **Ceiling**
 3. Door Size: 22" X 36"
 4. Stainless Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage
 - a. Finish: #4 – Brushed finish.
 5. Frame Material: Same material and thickness as door
 6. Hinges: Manufacturer's standard
 7. Hardware: Latch.
 8. Gasket: Neoprene Gasket
- D. Hardware:
1. Latch: Cam latch operated by screwdriver.
 2. Lock: As shown on Drawings.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

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2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 2. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
- F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.5 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. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

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- a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

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.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

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SECTION 08 7111 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes finish hardware for the proper operation and control of all doors in the Project. Prior to bidding, notify Architect of any doors that do not have hardware meeting this intention.
- B. Hardware supplier will be responsible to furnish and install hardware on labeled doors to satisfy State and Local Building Codes.
- C. Related Sections include the following:
 - 1. Division 8 Section "Hollow Metal Doors and Frames."
 - 2. Division 8 Section "Flush Wood Doors."

1.3 SUBMITTALS

- A. Product Data: For each product and material indicated, submit manufacturer's technical product data. Include information necessary to show compliance with requirements, installation instructions and maintenance instructions.
- B. Hardware Schedule: Submit a hardware schedule organized into sets, including the information below. Designations for door numbers and hardware sets shall match those used in the construction documents.
 - 1. Opening Number
 - 2. Door Type and Size
 - 3. Frame Type and Size
 - 4. Frame Anchoring Method
 - 5. Hardware Set
 - 6. Assembly Rating
- C. Hardware Schedule shall be coordinated with the doors, frames and related work to ensure proper size, thickness, hand function and finish of door hardware

1.4 QUALITY ASSURANCE

- A. Supplier Qualifications: A recognized Architectural Finish Hardware Supplier, with warehousing facilities, who has been furnishing hardware in the Project's vicinity for a period of not less

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- than two (2) years. Supplier shall be or employ an experienced Architectural Hardware Consultant (AHC) who is certified by and member of the Door and Hardware Institute. The Architectural hardware Consultant shall be available, at reasonable times during the course of the work, for consultation about Project's hardware requirements, to Owner, Architect and Contractor.
- B. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80, No. 101 and local building code requirements. Provide only hardware, which has been tested and listed, by UL, FM or Warnock Hersey for types and sizes of doors required and complies with requirements of door and door frame labels.
- C. Standards: Comply with the requirements of the latest edition of the following standards unless indicated otherwise:
1. American National Standards Institute Publications:
 - a. A115 Series – Door and Frame Preparation
 - b. A156 Series – Hardware
 2. Builders Hardware Manufacturer's Association Publications:
 - a. 1201 – Auxiliary Hardware
 - b. 1301 – Materials and Finishes
 3. Door and Hardware Institute Publications:
 - a. Keying – Procedures, Systems and Nomenclature
 - b. Abbreviations and Symbols
 - c. Hardware for Labeled Fire Doors
 - d. Recommended Locations for Builder's Hardware for Standard and Custom Steel Doors and Frames
 - e. Wood Door Standards W1, W2, WDHS-2, WDHS-3
 4. National Fire Protection Association Publications
 - a. NFPA 80 – Standards for Fire Doors and Windows
 - b. NFPA 101 – Life Safety Code
 5. International Building Code – 2015 Edition
 6. American with Disabilities Act.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Package each hardware item in separate containers with all screws, wrenches, installation instructions and installation templates. Mark each box with hardware heading and door number according to approved hardware schedule.
- B. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation: Provide a complete packing list showing items, door numbers and hardware headings with each shipment.
- C. Store hardware in shipping cartons above ground and under cover to prevent damage. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable -so that completion of the Work will not be delayed by hardware losses both before and after installation.

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1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with delivery and/or installation when ambient and substrate temperature conditions are outside limits permitted by material manufacturers.

PART 2 - PRODUCTS

2.1 HARDWARE GENERAL

- A. Provide the materials of products indicated by trade names, manufacturer's name, or catalog number. Substitutions will not be permitted except as described in Division 1.
- B. Provide manufacturer's standard products meeting the design intent of this Specification, free of imperfections affecting appearance or serviceability.
1. Provide hardware complete with all fasteners, anchors, instructions, layout templates, and any specialized tools as required for satisfactory installation and adjustment.
 2. Hand of Door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
 3. Furnish screws for installation with each hardware item. Provide Phillips flat head screws except as otherwise indicated or approved. Finish screws exposed under any condition to match hardware finish, or, if exposed in surface of other work, to match finish of such other work as closely as possible. Use machine screws for metal connections and wood screws for connections to wood. Use manufacturer's screws to secure hardware.
 4. Provide concealed fasteners for hardware unit with care exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt, head or nut on opposite face is exposed in other work, except where indicated otherwise or where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.
 5. Special Tools: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance and removal and replacement of finish hardware.
- C. Hardware is specified in the hardware schedule by set, type and functions, which have been selected as best meeting the application requirements. Acceptable products for each category are specified in Paragraph 2.5 "Hardware Products".

2.2 SPECIAL REQUIREMENTS

- A. General:
1. Where new doors and hardware are scheduled to be installed in existing frames, contractor to coordinate hinge sizes and locations, lockset backsets, strikes, hardware mounting heights, etc with existing frames to ensure new door and hardware fits and functions properly in existing frame.
- B. Hinges:

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1. Use heavy weight hinges for all doors.
 2. Provide non-removable pins for all exterior doors and out-swinging corridor doors. Use nonrising pins for all other doors.
 3. Pre-drill pilot holes for hinge fasteners at factory to suit hinge type.
- C. Locksets:
1. Locksets to be grade 1 heavy duty cylindrical or as specified.
- D. Exit Devices:
1. All latchbolts to be deadlatching type.
 2. All touchbars to be stainless steel.
 3. Devices are to incorporate a flush and tapered end cap.
 4. Devices incorporating plastic dogging components will not be allowed.
 5. Provide electrical options as specified.
- E. Closers:
1. Comply with manufacturer's recommendations for unit size based on door size and usage.
 2. Provide parallel arms for all overhead closers, except as otherwise indicated.
 3. All closers UL Listed Certified to be in compliance with UBC 7.2 and UL 10C.
 4. Closers with Pressure Relief Valves will not be acceptable.
 5. Provide any brackets or plates required for proper installation of door closers.
- F. Thresholds and Gasketing
1. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 2. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
 3. Gasketing and astragals on aluminum frames by door manufacturer.

2.3 KEYING

- A. Contractor to turn all cylinders over to MU key shop for keying.

2.4 FINISHES

- A. Standard: Comply with BHMA A156.18
1. All door hardware to be US26D throughout project.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the application units of hardware.
- C. Protect finishes on exposed surfaces from any damage by applying a strippable temporary protective covering before shipping.

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- D. BHMA Designations: Comply with base material and finish requirements indicated by BHMA standards.

2.5 HARDWARE PRODUCTS

ITEM	SPECIFIED	APPROVED EQUAL
Hinges	Ives	Stanley
Locksets	Best	Schlage, Sargent
Cylinders	Best	No Substitutions
Closers	LCN	No Substitutions
Panic Devices	Von Duprin	Sargent, Precision
Flatgoods	Ives	Burns, Rockwood
Stops	Ives	Burns, Rockwood
Overhead Stops	Glynn Johnson	Rixson
Gasket	Zero	NGP, Reese

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames with installer present for compliance with the requirements, for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine rough-in for electrical source power to verify actual locations of wiring connections before electrified door hardware installation.
- C. Notify Architect of any discrepancies or conflicts between the door schedule, door types, frame types, drawings, scheduled hardware and built condition.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Frames: Comply with ANSI/DHI A115 Series
- B. Wood Doors: Comply with ANSI/DHI A115-W Series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in the following applicable publications, or as required to comply with governing regulations:
- Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - Custom Steel Doors and Frames: DHI's "Recommended Locations for Builder's Hard

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- ware for Custom Steel Doors and Frames.”
3. Wood Doors: DHI WDHS.2 “Recommended Locations for Architectural Hardware for Wood Flush Doors.”
- B. Install each door hardware item to complete with manufacturer’s written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage and reinstallation of surface protective trim units to with finishing work. Do not install surface mounted items until finishes have been completed on substrates involved.
- 3.4 FIELD QUALITY CONTROL
- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in written report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.
- 3.5 ADJUSTING
- A. Initial Adjustment: Adjust and check each operating items of door hardware and each door to ensure proper operation of function of every unit. Replace units that cannot be adjusted to operate as intended and/or required. Adjust door control devices to compensation for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- 3.6 CLEANING AND PROTECTION
- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper finish, and provide final protection and maintain condition that ensure door hardware is without damage or deterioration at time of owner occupancy.
- 3.7 DEMONSTRATION AND TRAINING
- A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate and maintain door hardware and door hardware finishes.
- 3.8 DOOR HARDWARE SETS

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HARDWARE SET: 01

DOOR NUMBER:

1028

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	AUTO FLUSH BOLT	FB31P/FB41P	630	IVE
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	COORDINATOR	COR X FL X MB	628	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	GASKETING	8144SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8195AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER

HARDWARE SET: 02

DOOR NUMBER:

1029D 1030D 1031D 1032D

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	AUTO FLUSH BOLT	FB31P/FB41P	630	IVE
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	COORDINATOR	COR X FL X MB	628	IVE
2	EA	SURFACE CLOSER	4040XP SHCUSH	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	GASKETING	8144SBK PSA	BK	ZER
2	EA	DOOR BOTTOM	361AA	AA	ZER
1	EA	MEETING STILE	383AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

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HARDWARE SET: 03

DOOR NUMBER:

C1007 C1007A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY/224XY AS REQ'D	628	IVE
1	EA	PANIC HARDWARE	LD-99-EO	626	VON
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	WALL STOP/HOLDER	WS445	626	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER

HARDWARE SET: 04

DOOR NUMBER:

1026

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	PANIC HARDWARE	99-L-NL-17	626	VON
1	EA	SFIC RIM HOUSING	80-129	626	SCH
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 05

DOOR NUMBER:

1025

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	ENTRANCE LOCK	ND53BD SPA	626	SCH
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP H	689	LCN
3	EA	SILENCER	SR64	GRY	IVE

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HARDWARE SET: 06

DOOR NUMBER:

1007 1007A C1004 C1004A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	ENTRANCE LOCK	ND53BD SPA	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 07

DOOR NUMBER:

1027

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	PRIVACY W/COIN TURN	L9044 17A L583-363 L283-722	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 08

DOOR NUMBER:

1029C 1030C 1031C 1032C

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80BD SPA	626	SCH
1	EA	SFIC PERMANENT CORE	VERIFY TYPE REQ'D	626	BES
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP H	689	LCN
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR BOTTOM	361AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

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HARDWARE SET: 09

DOOR NUMBER:

C1007B C1007C C1007D C1007E C1007F C1007G

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1		HARDWARE BY DOOR / FRAME MANUFACTURER		

HARDWARE SET: 10

DOOR NUMBER:

1023 1024 1024A 1025A 1029 1029A
1029B 1030 1030A 1030B 1031 1031A
1031B 1032 1032A 1032B

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1		HARDWARE BY DOOR / FRAME MANUFACTURER		

END OF SECTION 08 71 11

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SECTION 08 80 00 - GLAZING

1. GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
1. See Section 00 73 00 "Supplementary Conditions", if included, for requirements relating to interpretation of the drawings and specifications.
 2. See Section 01 21 00 "Allowances", if included, for use of allowances and what may and may not be included in them.

1.2 SUMMARY

- A. This Section includes glazing for the following products:
1. Vision lites.
 2. Entrances and other doors.
 3. Storefront construction.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. See Section 08 52 00 "Wood Windows" for insulated glass in aluminum clad wood windows.

1.3 SUBMITTALS

- A. Product data for each glass product and glazing material indicated.
- B. Samples of manufacturer's standard sealant colors for selection by Architect.
- C. Samples of glass to include tinted glass.

1.4 QUALITY ASSURANCE

- A. Glazing Publications: Comply with "FGMA Glazing Manual" and "LSGA Design Guide," except where more stringent requirements are indicated.
- B. Safety Glass: ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC).

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- C. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar to that indicated for Project.
 - 1. Note that the glazing subcontractor shall provide safety glazing in all locations where required by the Building Code whether shown on the drawings or not.
 - a. The glazing subcontractor shall verify which version of the Building Code has been adopted by the governing authority where the project will be built.
- D. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar to that indicated for Project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials.

1.6 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contactor under requirements of the Contract Documents.
- B. Manufacturer's Warranty on Coated Glass Products: Submit written warranty signed by coated glass manufacturer agreeing to furnish replacements for those coated glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.
 - 1. Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.
- C. Manufacturer's Warranty on Laminated Glass: Submit written warranty signed by insulating glass manufacturer agreeing to furnish replacements for those laminated glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to glass manufacturer's published instructions.
 - 1. Warranty Period: Manufacturer's standard but not less than 5 years after date of Substantial Completion.

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- D. **Manufacturer's Warranty on Insulating Glass:** Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.
1. **Warranty Period:** Manufacturer's standard but not less than 10 years after date of Substantial Completion.

2. PRODUCTS

2.1 MANUFACTURERS

- A. **Available Products:** Subject to compliance with requirements, provide products of the following:
1. Ford Glass Division
 2. Libby-Owens-Ford Co.
 3. P.P.G. Industries, Inc.
- B. See Glass Schedule at the end of this section for specific glass types.

2.2 LAMINATED GLASS PRODUCTS

- A. **Laminated Glass Products:** Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified at the end of this Section. Refer to primary and heat-treated glass requirements relating to properties of glass products comprising laminated glass products.
- B. **Interlayer:** Interlayer material as indicated below, in clear or colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. **Polyvinyl Butyral Interlayer:**
 - 1) Saflex, Monsanto Co.
 - 2) Butacite, E.I. du Pont De Nemous & Co., Inc.
- C. **Laminating Process:** Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
1. Lamine lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.3 ELASTOMERIC GLAZING SEALANTS

GLAZING

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- A. General: Comply with glass manufacturer's recommendations.
- B. Colors: As selected by Architect from manufacturer's standards.
- C. Elastomeric Glazing Sealant Standard: ASTM C 920.

2.4 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with 100% solids content, nonstaining and nonmigrating, with or without spacer rod as recommended by tape and glass manufacturers, and complying with AAMA 800.

2.5 GLAZING GASKETS

- A. Glazing Gaskets: Resilient polyvinylchloride or other material as required.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers and Sealers: As recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Shore A durometer hardness of 85 plus or minus 5.
- C. Spacers: Blocks or extrusions with a Shore A durometer hardness as required.
- D. Edge Blocks: As needed to limit glass lateral movement (side-walking).

3. EXECUTION

3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with installation tolerances; minimum required face or edge clearances; and effective sealing between joints of glass-framing members.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.3 GLAZING

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

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- B. Protect glass from edge damage during handling and installation. Use a rolling block in rotating glass to prevent damage to corners. Use suction cups to shift glass within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges.
- C. Apply primers to joint surfaces where required for adhesion of sealants.
- D. Install elastomeric setting blocks, sized and located to comply with glazing standard. Set blocks in thin course of sealant suitable for heel bead.
- E. Provide spacers for glass sizes larger than 50 united inches. Provide 1/8 inch minimum bite and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- F. Provide edge blocking to comply with requirements of referenced publications.

3.4 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction for build-up of alkali deposits or stains and remove as recommended by glass manufacturer.
- C. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- D. Wash glass on both faces in each area of Project not more than 4 days prior to Substantial Completion. Wash glass as recommended by glass manufacturer.

3.5 GLASS SCHEDULE

A. CLEAR FLOAT GLASS

1. Description: Type I, Class 1, Quality q3.
2. Thickness: 1/4" unless otherwise noted.

B. CLEAR SAFETY GLASS

1. Description: Type I, Class 1, Quality q3, Kind FT, Condition A.
2. Thickness: 1/4" unless otherwise noted.

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C. CLEAR INSULATING FLOAT GLASS

1. Description: Type I, Class 1, Quality q3.
2. Low Emissivity Coating: Magnetically sputtered on second surface.
3. Thickness: 1/4" glass, 1/2" air space, 1" overall.

D. LAMINATED CLEAR GLASS

1. Description: Type I, Class I, Quality q3, Kind LT (two lites of fully tempered Type I glass).
2. Thickness of Plastic Interlayer: 0.030 inch (8 mm).
3. Color of Plastic Interlayer: Clear.
4. Thickness: 1/2" unless otherwise noted.

E. CLEAR INSULATING SAFETY GLASS

1. Description: Type I, Class 1, Quality q3, Kind FT, Condition A.
2. Low Emissivity Coating: Magnetically sputtered on second surface.
3. Thickness: 1/4" glass, 1/2" air space, 1" overall.

END OF SECTION 08 80 00

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, 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, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

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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. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 1. American Gypsum.
 2. CertainTeed Corp.
 3. Georgia-Pacific Gypsum LLC.
 4. National Gypsum Company.
 5. USG Corporation.
 6. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. **Gypsum Board, Type X:** ASTM C 1396/C 1396M.
 1. Thickness: 5/8 inch (15.9 mm).
 2. Long Edges: Tapered.
- C. **Moisture- and Mold-Resistant Gypsum Board:** ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 1. Core: 5/8 inch (15.9 mm), Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

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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.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Fry Reglet Corp.
 - b. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Class I Clear Anodic Finish: AA-C12C22A3.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use 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.

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5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

- E. Acoustical 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, provide one of the following:

- a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
- b. Grabber Construction Products; Acoustical Sealant GSC.
- c. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
- d. USG Corporation; SHEETROCK Acoustical Sealant.
- e. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

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- 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 recommendations 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: As indicated on Drawings.
 - 2. Moisture- and Mold-Resistant Type: Walls to 48" AFF where floor elevation is below surrounding grade on any side of building.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

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2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- E. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
 1. If control joints are not shown on the drawings they shall be located at a maximum of 30 feet o.c. Coordinate exact location with Architect prior to installation.
- C. Interior Trim: Install in the following locations:

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1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use where indicated.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840 and Gypsum Association GA-214-10.
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 5: All locations.
 - a. Primer and its application to surfaces are specified in Section 09 96 00 "High Performance Coatings."

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

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SECTION 09 67 33 – TROWEL-APPLIED RESINOUS FLOORING

1. PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Resinous flooring systems with high-build double-broadcast applied flooring system consisting of 100% solids epoxy binder, that consists of epoxy resin ad colored quartz aggregate with a high-solids, two-component 100% aliphatic urethane topcoat providing a slip-resistant surface on interior concrete floors.
 - 2. Installer pre-approval required.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-In-Place Concrete".
 - 2. Section 07 92 00 - "Joint Sealants" for sealants.
 - 3. Section 09 65 16 "Resilient Sheet Flooring".

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-Installation Conference: Conduct conferenced at Project Site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's technical data, material test reports, application instructions, chemical resistance, surface preparation, and application instructions.
- B. Samples for Initial Selection: For each type of exposed finish and texture required.
- C. Samples for Verification: For each resinous flooring system required, 12 inches (300-mm) square, applied to rigid backing by Installer for this Project.
 - 1. **Samples for review of color and texture.**

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- D. Test Data: Provide a letter confirming that the concrete substrate meets all specified requirements prior to commencing with floor finish installation. Include in letter, documentation of test results showing passing results.**

1.5 INFORMATIONAL SUBMITTALS

A. Installer Qualifications:

1. Provide documentation of the requirements listed under Quality Assurance.
2. Applicator personnel shall be trained for application of specified materials.
 - a. Provide a list of employees trained for application of specified materials.
3. Provide a list of completed projects including project name and location, name of Architect, name of material manufacturer, and approximate quantity of materials applied.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. **Installer Qualifications:** An authorized representative who employs only persons trained and approved by resinous flooring manufacturer for applying resinous flooring systems indicated.
1. **Qualifications of installers for resinous flooring system shall not be less than seven (7) years of experience installing resinous flooring systems indicated.** Resinous flooring installer shall be manufacturer approved and have performed at least ten similar installations. Resinous flooring installer shall have a minimum of 1,000,000 square feet of successful applications.
 2. **Special Coatings System Installers must be pre-approved by the Architect.** Subject to the requirements of the specifications and approval of the manufacturer, pre-approved installers are listed in paragraph 2.3 of this Section.
- B. **Pre-Application Meeting:** Convene a pre-application meeting two (2) weeks before the start of application of floor coating system. Require attendance of parties directly affecting work of this section, including the Contractor, Architect, Applicator, Manufacturer's Representative, and Owner's Representative. Review the surface preparation, application, cleaning, protection, and coordination with other work.

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- C. **Source Limitations:** Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 PROJECT CONDITIONS

- A. **Environmental Limitations:** Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. **Lighting:** Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.10 WARRANTY

- A. Manufacturer's written warranty against defects and wear for a period of five (5) years, including:
 - 1. Delamination from substrate.
 - 2. Loss of aggregate.
 - 3. Degradation of finish.
 - 4. Cracking and spalling
 - 5. Water penetration.

2. PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. **Flammability:** Self-extinguishing according to ASTM D 635.

2.2 MANUFACTURERS

- A. **Source Limitations:**

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1. Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer.
2. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials of type and from manufacturer recommended in writing by manufacturer of primary materials.

- B. Requests for manufacturer substitutions prior to bidding will be reviewed and responded to in conformance with Division 1 requirements.

2.3 INSTALLERS

- A. **Installer must be approved by epoxy resinous flooring manufacturer.** Subject to compliance with requirements engage one of the following Resinous Flooring System Installers:

1. Abstract Painting, Council Bluffs, IA (712) 328-3231.
2. Desco Coatings, Inc., Olathe, KS (913) 782-3330.
3. Epoxy Coating Specialists, Kansas City, KS (913) 362-4141.
4. McGill Brothers, Omaha, NE (402) 556-0915.
5. Prime Coat Coating Systems, (847) 972-2146.
6. SCS Flooring, Homestead, IA (319) 622-3049.
7. Stonhard®, Omaha, NE (302) 983-7097- Chris Pawson, cpawson@stonhard.com.
8. Surface Sealers, Lincoln, NE (402) 474-2440.
9. W.S. Bunch Co., Omaha, NE (402) 558-4242.

2.4 RESINOUS FLOORING

- A. Resinous Flooring System: Abrasion-resistant, impact-resistant, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor.

1. **Basis-of-Design—EPX-1:** Res-Tek—EPO-CQ Double Broadcast colored Quartz Resinous Flooring System:
2. **Acceptable pre-approved Manufacturers—Towel-Applied Epoxy Resinous Flooring subject to compliance w/ Basis of Design product requirements include:**
 - a. Tnemec Company - DecoTrowel
 - b. Desco Coatings, Inc—Cremona TG.
 - c. Stonhard®, Inc—Stonshield® HRI with Stonseal SK6 Sealer/Top Coat.
 - d. Tennant Company—DQS Troweled Decorative Quartz System.

- B. Color(s):

1. **EPX-1** Res-Tek—Pattern and Color: As selected by Architect from manufactures full line of finishes. Verify Color with Owner.

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C. System Characteristics:

1. Colored Flake with 100 percent solids according to ASTM D2369. Completely light stable over the normal life of the coating.
2. Wearing Surface: Medium Textured for slip resistance, match Architect's sample. Integral.
3. Cove Base: 4 inches high or as noted on drawings.
4. Overall System Thickness: 1/4-inch (6.4-mm) finish over sloped patching and fill material.

D. **System Components:** Manufacturer's standard components that are compatible with each other and as follows:

1. **Primer:** Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated.
 - a. Basis of Design Product: **Res-Tek EPO-203**— High-Solids, Two-Component Moisture-Tolerant Modified Polyamine Epoxy.
 - b. Formulation Description: 100 percent solids.
2. **Floor Slope Build:**
 - a. Basis of Design Product: Modified Polyamine Epoxy. Mix with Portland cement, aggregate and dry silica as recommended by manufacturer.
 - b. Formulation Description: 100 percent solids.
3. **Body Coat—1st coat:**
 - a. Basis of Design Product: **Res-Tek EPO-203 Pigmented** — Modified Polyamine Epoxy.
 - b. Formulation Description: 100 percent solids.
 - c.
4. **Broadcast—2 coats to refusal:**
 - a. Broadcast Colored Flake per manufacturer's written instructions.
5. **Body Coat—2nd coat:**
 - a. Basis of Design Product: **Res-Tek EPO-204** — Modified Polyamine Epoxy.
 - b. Formulation Description: 100 percent solids.
6. **Coved Base:**

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- a. Basis of Design Product: **Res-Tek EPO-203**— High-Solids, Two-Component Moisture-Tolerant Modified Polyamine Epoxy. to form a rolled radius cove.
 - b. Apply a 4" rolled radius cove to all floor wall/curb transitions in accordance with the CSM's written instructions and as indicated on the standard drawing details. Application Rate per manufacturer's written instructions.
 - c. Dry Film Thickness: 3/16" (minimum 1/8") DFT.
7. **Grout Coat:**
- a. Basis of Design Product: **Res-Tek EPO-204**—Epoxy. A Two-Component Modified Polyamine Epoxy.
 - b. Dry Film Thickness: 14 - 18 DFT.
8. **Topcoats:** Sealing or finish coats.
- a. Basis of Design Product: **Res-Tek ISO-103**—Epoxy. High Traffic Urethane Finish Coat.
 - b. Formulation Description: High Solids.
 - c. Type: Clear.
 - d. Finish: Satin/Low Sheen
 - e. Finish Texture: Manufacturer's standard
 - f. Dry Film Thickness: 2.0 – 3.0 DFT.
- E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated
1. Compressive Strength: 15,567 psi per ASTM C 579.
 2. Tensile Strength: 2,200 psi per ASTM C 307.
 3. Flexural Modulus of Elasticity: 4,550 psi per ASTM C 580.
 4. Indentation: 2,000 psi according to MIL-D-3134.
 5. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch (1.6-mm) permanent indentation per MIL-D-3134J.
 6. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch (1.6 mm) per MIL-D-3134J.
 7. Abrasion Resistance: 0.18gm maximum weight loss per ASTM D 4060.
 8. Coefficient of Friction: 0.5 minimum according to STM D-2047.
 9. Hardness: 85 - 90, Shore D per ASTM D 2240.
- F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected by the following:
1. 20% Hydrochloric Acid.
 2. Mercurochrome.
 3. Betadyne.
 4. Urine.
 5. Coffee.

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6. Ethyl Alcohol.
7. Iodine.
8. 10% Lactic Acid.
9. Tea.
10. Mustard.

2.5 ACCESSORIES

- A. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- B. **Metal Edge Strips:** Metal strips are to be provided by Resinous Flooring Installer and used at transitions between epoxy and adjacent floor finishes.

3. PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 1. Roughen concrete substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
 - c. Create a surface profile similar to ICRI-CSP5.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1,000 sq. ft. (1.36 kg of water/92.9 sq m) of slab area in 24 hours.

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- b. Plastic Sheet Test: ASTM D 4263. Proceed with application only after testing indicates absence of moisture in substrates.
 - c. Relative Humidity Test: Use in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have neutral pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
 - C. Patching and Filling: Use patching and fill and build material to fill holes and depressions in substrates and to provide floor slopes where indicated according to manufacturer's written instructions to build floor surface to the specified slopes. Fill, sand or grind cured floor build to eliminate surface imperfections and trowel marks.
 1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.
 - D. Resinous Materials: Mix components and prepare according to resinous flooring manufacturer's written instructions.

3.2 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Floor Slope Build: Apply floor slope build product, where indicated, over primed substrate per manufacturer's recommendations.
- D. Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base. Round internal and external corners.

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- E. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.
- F. Double Broadcast Body Coats: Apply double broadcast body coats to refusal in thickness indicated for flooring system.
- G. Topcoats: Apply topcoat(s) in number of coats indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.
- H. Add glass beads and/or top coats to achieve desired surface texture and uniformity.

3.3 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 09 67 33

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SECTION 09 96 00 – HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:
 - 1. Interior Substrates:
 - a. Concrete Masonry Units
 - b. Gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. 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.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, which match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

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1. Coatings: 5 percent, but not less than **1 gal. (3.8 L)** of each material and color applied.

1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** An experienced installer who employs only persons trained and approved by special coatings manufacturer for applying special coatings systems indicated.
 1. Qualifications of installers for special coatings system shall not be less than five years of experience installing specified items. Special coatings installer shall be manufacturer approved and have performed at least ten similar installations.
 2. Special Coatings System Installers must be pre-approved by the Architect. Subject to the requirements of the specifications and approval of the manufacturer, pre-approved installers are listed in paragraph 2.1 of this Section.
- B. **Single-Source Responsibility:** Provide primers and undercoat material produced by the same manufacturer as the finish coats for each type of coating. Use only thinners recommended by the manufacturer and only within recommended limits.
- C. **Mock-ups:** Apply mock-ups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. **Wall and Ceiling Surfaces:** Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. **Other Items:** Architect will designate items or areas required.
 2. Apply mock-ups after permanent lighting and other environmental services have been activated.
 3. Final approval of color selections will be based on mock-ups.
 - a. If preliminary color selections are not approved, apply additional mock-ups of additional colors selected by Architect at no added cost to Owner.
 4. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.
 5. Subject to compliance with requirements, approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

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1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 3. Products shall be of same manufacturer for each coat in a coating system.

2.2 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

HIGH-PERFORMANCE COATINGS

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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. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify compatibility with and 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.
- G. Notify the Architect of problems anticipated using the coatings specified over substrates primed by others.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

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- A. **Provide finish coats compatible with the primers used.**
- B. Apply high-performance coatings according to manufacturer's written instructions and recommendations.
1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - a. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- D. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- E. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.
- F. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Where sanding is required, according to the manufacturer's directions, sand between applications to produce a smooth, even surface.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
1. Contractor shall touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

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3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.
- E. Provide "Wet Paint" signs to protect newly coated finishes.
- F. Refer to the drawings, room finish schedules and notes for paint requirements. Architect shall approve all "match adjacent surfaces" colors before painting begins.

3.6 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility.
 - 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. Provide products of same manufacturer for each coat in a coating system.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 3. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - 4. Non-flat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - 5. Anticorrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC content of not more than 250 g/L.
 - 6. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - 7. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 - 8. Floor Coatings: VOC not more than 100 g/L.
 - 9. Shellacs, Clear: VOC not more than 730 g/L.
 - 10. Shellacs, Pigmented: VOC not more than 550 g/L.
 - 11. Stains: VOC content of not more than 250 g/L.
 - 12. Flat Interior Topcoat Paints: VOC content of not more than 50 g/L.
 - 13. Non-flat Interior Topcoat Paints: VOC content of not more than 150 g/L.
 - 14. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 15. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.

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16. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
17. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.

D. Colors: As selected by Architect from manufacturer's full range

E. HIGH-PERFORMANCE COATINGS SCHEDULE

<u>LOCATION</u>	<u>SHEEN</u>	<u>COATINGS SYSTEM</u>
Interior Zinc Coated Metal	Semi-Gloss	IZM-1X
Interior Zinc Coated Metal	Semi-Gloss	IZM-2X
Interior Ferrous Metal	Semi-Gloss	IFM-1X

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Interior Ferrous Metal	Semi-Gloss	IFM-6X
Interior Ferrous Metal	Satin	IFM-7X
Interior Aluminum	Semi-Gloss	IAM-1
Interior Gypsum Drywall (Epoxy)	Semi-Gloss	GDW-51
Interior Gypsum Drywall (Epoxy)	Satin	GDW-101
Interior CMU/Concrete (Epoxy)	Gloss Epoxy	CMU-31 (PTE)

3.7 INTERIOR HIGH-PERFORMANCE COATING SYSTEMS

A. System IZM-1X for application on Interior Zinc Coated Metal:

1. Semi-Gloss Acrylic Polyurethane: 1 finish coat over 1 intermediate coat and an organic zinc rich primer. (Primer to be applied by metal fabricator in shop.)
2. Metal Primer: Organic primer used to touch-up primed interior zinc-coated metal surfaces. (**See Division 05 Section 05 50 00 for related shop priming requirements.**) (**See Sections 05-12-00, 05-21-00, 05-31-00, 05-50-00, 05-51-13, 05-52-13, and 05-73-13 for shop priming requirements.**) **ALKYD PRIMERS ARE NOT PERMITTED ON HIGH-PERFORMANCE-COATED SURFACES, Typ.**
 - a. Thickness: 2.5 – 3.5 mils.
 - b. PPG Paints: Durethane MCZ, 97-699.
 - c. PPG Paints: PMC Amercoat 68HS Zinc Rich Epoxy Primer.
 - d. SW: Corothane I Galvapac.
 - e. Tnemec: Tneme-Zinc, 90-97.
 - f. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
3. Polyimide Epoxy Intermediate Coat: Weather-resistant epoxy for use over primed, zinc-coated metal surfaces.
 - a. Thickness: 3 – 4 mils.
 - b. PPG Paints: PMC Amercoat 370 Fast-Dry Multi-Purpose Epoxy.
 - c. SW: Macropoxy 646 Fast Cure Epoxy.
 - d. Tnemec: Tneme-Fascure, Series 161
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
4. Aliphatic Acrylic Semi-Gloss Polyurethane: Weather-resistant opaque coat for use over primed, zinc-coated metal surfaces: CUSTOM Color as selected by Architect (solid color).
 - a. Thickness: 3 – 4 mils.
 - b. PPG Paints: Amercoat 450 HSG.
 - c. SW: Acrolon 218 SG.
 - d. Tnemec: Endura-Shield, Series 1075.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

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B. System IZM-2X for application on Interior Zinc Coated Metal:

1. Semi-Gloss Acrylic Polyurethane: 1 finish coat over 1 intermediate coat and an organic zinc rich primer. (Primer to be applied by metal fabricator in shop.)
2. Metal Primer: Organic primer used to touch-up primed interior zinc-coated metal surfaces. (See Sections 05-12-00, 05-21-00, 05-31-00, 05-50-00, 05-51-13, 05-52-13, and 05-73-13 for shop priming requirements.) **ALKYD PRIMERS ARE NOT PERMITTED ON HIGH-PERFORMANCE-COATED SURFACES, Typ.**
 - a. Thickness: 2.5 – 3.5 mils.
 - b. PPG Paints: Durethane MCZ, 97-699.
 - c. PPG Paints: PMC Amercoat 68HS Zinc Rich Epoxy Primer.
 - c. SW: Corothane I Galvapak.
 - d. Tnemec: Tneme-Zinc, 90-97.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
3. Polyimide Epoxy Intermediate Coat: Weather-resistant epoxy for use over primed, zinc-coated metal surfaces.
 - a. Thickness: 3 – 4 mils.
 - b. PPG Paints: PMC Amercoat 370 Fast-Dry Multi-Purpose Epoxy.
 - c. SW: Macropoxy 646 Fast Cure Epoxy.
 - d. Tnemec: Tneme-Fascure, Series 161
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
4. Acrylic Semi-Gloss Polyurethane: Opaque coat for use over primed, zinc-coated metal surfaces: Color as selected by Architect from manufacturer's standards.
 - a. Thickness: 3 – 4 mils.
 - b. PPG Paints: Pitthane High-Build Semi-Gloss Urethane Enamel, 95-8800 Series.
 - c. SW: Acrolon 218 SG.
 - d. Tnemec: CRU (Chemical Resistant Urethane), Series 290.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

C. System IFM-1X for application on Interior Ferrous Metal—Solid color:

1. Semi-Gloss Acrylic Polymer: 2 finish coats over an epoxy primer. (Primer to be applied by metal fabricator in shop.) / 2 finish coats over an epoxy primer used on interior ferrous metal surfaces shall be full-prime coated, Typical and applied per manufacturer's written specifications.
2. Touch-Up Metal Primer: Epoxy primer used on interior ferrous metal surfaces shall be touch-up primed as required if pre-primed steel is used, Typical and applied per manufacturer's written specifications. (See Division 05 Section 05 50 00 for related shop priming requirements). (See Sections 05-12-00, 05-21-00, 05-31-00, 05-50-00, 05-51-13, 05-52-13, and 05-73-13 for shop priming requirements.) **ALKYD PRIMERS ARE NOT PERMITTED ON HIGH-PERFORMANCE-COATED SURFACES, Typ.]**

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- a. Thickness: 2.5 – 3.5 mils.
 - a. PPG Paints: Amerlock, 2/400.
 - b. SW: Macropoxy 646 Fast Cure Epoxy.
 - c. Tnemec: Epoxoline, Series 66.
 - d. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
3. Metal Primer: Epoxy primer used on interior ferrous metal surfaces shall be full-prime coated, Typical and applied per manufacturer's written specifications. (See Division 05 Section 05 50 00 for related shop priming requirements). (See Sections 05-12-00, 05-21-00, 05-31-00, 05-50-00, 05-51-13, 05-52-13, and 05-73-13 for shop priming requirements.) **ALKYD PRIMERS ARE NOT PERMITTED ON HIGH-PERFORMANCE-COATED SURFACES, Typ.**
- a. Thickness: 2.5 – 3.5 mils.
 - b. PPG Paints: TBD.
 - c. SW: TBD.
 - d. Tnemec: TBD.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
4. Thermoset Semi-Gloss Fluoro-Polymer: Opaque coat for use over primed, ferrous metal surfaces: Color as selected by Architect from manufacturer's standards.
- a. Thickness: 3 – 4 mils.
 - b. PPG Paints: Corafon ADS (solid color).
 - c. SW: Shercryl HPA.
 - d. Tnemec: HDP Acrylic Polymer, Series 1029.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
- D. **System IFM-7X for application on Interior Ferrous Metal:**
1. Satin Waterborne Acrylic Epoxy Finish: 1 finish coat over a Self-Crosslinking Hydrophobic Acrylic Primer to be full-prime coated, Typical and applied per manufacturer's written specifications.
 2. Metal Primer: Self-Crosslinking Hydrophobic Acrylic Primer used on interior ferrous metal surfaces shall be full-prime coated, Typical and applied per manufacturer's written specifications. Finish/Sheen—Eggshell. **ALKYD PRIMERS ARE NOT PERMITTED ON HIGH-PERFORMANCE-COATED SURFACES, Typ.**
- a. Thickness: 2 - 4 mils DFT.
 - b. SW: TBD.
 - c. Tnemec: Uni-Bond DF Series 115 Primer.
 - d. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

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3. Finish Coat—Satin Waterborne Acrylic Epoxy: Opaque coat for use over Self-Crosslinking Hydrophobic Acrylic Primer, for application on interior ferrous metal surfaces. Finish/Sheen—Satin. Color as selected by Architect from manufacturer's standards:
 - a. Thickness: 4 - 6 dry mils DFT.
 - b. SW: Pro Industrial WB Epoxy.
 - c. Tnemec: Series 113 HB Tuf-Coat.
 - d. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
- E. System IAM-1X for application on Interior Aluminum Metal—Solid Color:
1. Polyamide Epoxy: 1 finish coat over polyamide epoxy primer. (Primer may be applied by metal fabricator in shop or field-applied.)
 2. Metal Primer: Polyamide epoxy primer for use over aluminum surfaces. Mechanically abrade or abrade blast to create a uniform 1.0 mils anchor profile before applying primer.
 - a. Thickness: 3 – 4 mils.
 - b. PPG Paints: Amercoat 2.
 - c. SW: Macropoxy 646 Fast Cure Epoxy.
 - d. Tnemec: Tneme-Fascure, Series 161.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
 3. Polyamide Epoxy: Polyamide Epoxy solutions for use over primed, aluminum metal surfaces: Color—See drawings.
 - a. Thickness: 2 – 3 mils.
 - b. PPG Paints: Amercoat 2.
 - c. SW: Macropoxy 646 Fast Cure Epoxy.
 - d. Tnemec: Tneme-Fascure, Series 161 Semi-Gloss (Solid Color).
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
- F. System GDW-51 for application on Interior Gypsum Drywall—MODIFIED:
1. Eggshell / Semi-Gloss Latex Epoxy Finish: 2 finish coats over primer.
 2. Latex-Based Interior White Primer: Latex-based primer coating used on interior gypsum drywall under an epoxy finish:
 - a. PPG Paints: "Pure Performance" Interior Latex Primer, 9-900 Series.
 - b. SW: "Harmony" Interior Latex Primer, B11W900, applied at 4 mils wet, 1.3 mils dry per coat.
 - c. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
 3. Eggshell / Semi-Gloss Latex Epoxy Finish: Color as selected by Architect from manufacturer's standards:

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- a. PPG Paints: Pitt-Glaze WB1 Water Based Pre-Catalyzed epoxy. (Eggshell finish) 16-310. Applied at 1.5 DFT.
- b. PPG Paints: Pitt-Glaze WB 1 Water Based Pre-Catalyzed Epoxy. (Semi-Gloss finish) 16-510. Applied at 1.5 DFT.
- c. SW: Pro Industrial™ Water-Based Pre-Catalyzed Epoxy (Eggshell finish), K45 Series, applied at 1.5 mils dry per coat.
- d. SW: Pro Industrial™ Water-Based Catalyzed Epoxy (Semi-Gloss finish), B70W211 / B60V25, applied at 2.5 – 3 mils dry per coat.
- e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

G. System GDW-101 for application on Interior Gypsum Drywall:

1. Satin Waterborne Acrylic Epoxy Finish: 1 intermediate coat and 1 finish coat over primer.
2. Waterborne Primer/Sealer: Waterborne primer coating used on interior gypsum drywall under an epoxy finish.
 - a. Thickness: 1.0 mils DFT.
 - b. SW: Promar 200 Primer.
 - c. Tnemec: Series 51 PVA Sealer.
3. Intermediate Coat—Satin Waterborne Acrylic Epoxy: Opaque coat for use over primed, interior gypsum drywall surfaces: Finish/Sheen—Satin. Color as selected by Architect from manufacturer's standards:
 - a. Thickness: 4 - 6 mils DFT.
 - b. SW: Pro Industrial WB Epoxy.
 - c. Tnemec: H.B. Tneme-Tufcoat Series 113 Waterborne Acrylic Epoxy Finish—Satin.
4. Finish Coat—Satin Waterborne Acrylic Epoxy: Opaque coat for use over intermediate coat, for application on interior gypsum drywall surfaces. Finish/Sheen—Satin. Color as selected by Architect from manufacturer's standards:
 - a. Thickness: 4 - 6 mils DFT.
 - b. SW: Pro Industrial WB Epoxy.
 - c. Tnemec: H.B. Tneme-Tufcoat Series 113 Waterborne Acrylic Epoxy Finish—Satin.
 - d. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

H. System EPX-1 (Alternative) for application on Interior Slabs—Epoxy Non-Skid Resinous Floors:

1. Mock-ups: Contractor shall provide a mock-up to set quality standards for materials and non-skid surface execution for approval by the Owner and the Architect.
2. Concrete Primer: Concrete primer for use over cured concrete:
 - a. DV: Mult-E-Poxy 180 with non-skid additive.
 - b. PPG Paints: Pitt-Guard Rapid Coat Epoxy, 95-245 Series.
 - c. SW: Macropoxy 646 FC Epoxy, B58-600 Series with non-skid additive.

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- d. Tnemec: Tneme-Fascure, Series 161.
 - e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.
3. Polyamide Epoxy Finish coat: 1 coat of satin epoxy over primed concrete floors: Color as selected by Architect from manufacturer's standards:
- a. DV: Mult-E-Poxy 180.
 - b. PPG Paints: Pitt-Guard Rapid Coat Epoxy, 95-245 Series with aggregate to provide a non-skid finish.
 - c. SW: Macropoxy 646 FC Epoxy, B58-600 Series.
 - d. Tnemec: Tneme-Fascure, Series 161 with 211 glass beads added at a rate of 2 oz. per gallon.
- NOTE: Modify top coat to comply with non-slip conditions for shower enclosures.**
- e. Or equal, if and as specifically approved by Architect by Addendum during bidding period.

F. System CMU-31 for application on Interior Concrete/CMU:

1. Low Odor Water-based Semi-Gloss Pre-Catalyzed Epoxy Finish: Two (2) coats over filled surface with total dry film thickness not less than 3.5 mils excluding filler coat.
2. High Performance Latex Block Filler: Heavy Duty latex block filler used for filling open textured interior concrete masonry block before application of top coats:
 - a. DV: DiaPro Acrylic Block Filler.
 - b. P & L: Krylon Industrial Heavy Duty Block Filler K-Z8465.
 - c. PPG Paints: SPEEDHIDE® Hi-Fill Interior/Exterior Latex Block Filler. Apply at a DFT of not less than @ 8.0 mils DFT.
 - d. S-W: Pro Industrial™ Heavy Duty Block Filler, B42W46. Apply at a DFT of not less than @ 8.0 mils DFT.
3. Water-based Semi-Gloss Pre-Catalyzed Epoxy: Two (2) coats of semi-gloss pre-catalyzed epoxy for use over a primer on concrete and masonry.
 - a. DV: Eas-E-Poxy Pre-Catalyzed Waterborne Semi-Gloss Epoxy, ME-0574 / ME-1575 / ME-1573, applied at 2- 3 mils dry per coat.
 - b. P & L: Krylon Industrial Precat Epoxy Acrylic Semi-Gloss K-Z7200 Series applied at 1.5 mils dry per coat.
 - c. PPG Paints: PITT-GLAZE® WB1 Interior Semi-Gloss Pre-Catalyzed Water-Borne Acrylic Epoxy, applied at 1.5 mils dry per coat.
 - d. S-W: Pro Industrial™ Water-Based Pre-Catalyzed Epoxy, K46 Series, applied at 1.5 mils dry per coat.

END OF SECTION 09 96 00

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South Farm - Swine Research and Education Facility Addition
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SECTION 10 28 00 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
 - 1. See Section 00 80 00 "Supplementary Conditions", if included, for requirements relating to interpretation of the drawings and specifications.
 - 2. See Section 08 83 00 "Mirrors" for frameless mirrors.
 - 3. See Division 26 "Electrical" for Electrical Systems and Components if included, for requirements relating to interpretation of the drawings and specifications.

1.2 SUMMARY

- A. Section Includes:
 - 1. Stainless Steel Napkin/Tampon Vending.
 - 2. Stainless Steel Surface-Mounted Multi-Roll Toilet Tissue Dispenser.
 - 3. Stainless Steel Surface-mounted Sanitary Napkin Disposal.
 - 4. Stainless Steel Surface-mounted Seat Protector Dispenser.
 - 5. Grab Bar: Satin-Finish Stainless Steel, 1-1/2" (38 mm) diameter.
 - 6. Horizontal Wall-Mount Baby Changing Station.
 - 7. Underlavatory Guards.
 - 8. Mop and Broom Holder (Custodial Accessories).
 - 9. Framed Mirror

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following.

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1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 3. Include electrical characteristics.
 4. Features that will be included for Project.
 5. Manufacturer's warranty.
- B. Samples: Full size, for each exposed product and for each finish specified.
1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify locations using room designations indicated.
 2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

- B. Manufacturer's Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective automated hand dryer components and labor within specified warranty period.
1. Warranty Period: One (1) year limited for labor and five (5) years for parts.
- B. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, visible silver spoilage defects.
 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

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- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PERFORMANCE 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.

2.3 SANITARY NAPKIN/TAMPON VENDING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Bobrick Washroom Equipment, Inc.
 - 2. Bradley Corporation
 - 3. Foundations Worldwide, Inc.
 - 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Bobrick Washroom Equipment, Inc., ConturaSeries® Recessed Napkin/Tampon Vendor, Product #B-4706 50.

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1. Finish: Satin-Finish Type #304 Stainless Steel. Recessed Napkin/Tampon Vendor combines two dispensing mechanisms in one at user's option. Mechanical operations; no batteries or electricity required. Dispensing mechanisms shall be pre-set at factory for \$.50 operation, but shall be convertible in the field to allow the change of coin denomination without removing the unit from the wall. Door shall be furnished with graphics indicating specified coin denomination. Unit shall be type 304 stainless steel with all welded construction; exposed surfaces shall have #4 satin finish. Flange shall be drawn, one-piece seamless construction. Door shall be drawn, 18-gauge (1.2 mm), one-piece seamless construction; secured to cabinet with a full-length stainless steel piano-hinge; and equipped with a stainless steel cable door-swing limiter and two flush tumbler locks keyed like other Bobrick washroom accessories. Install per manufacturer's written instructions.

2.4 STAINLESS STEEL SURFACE-MOUNTED MULTI-ROLL TOILET TISSUE DISPENSER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation
 3. Foundations Worldwide, Inc.
 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Bobrick Washroom Equipment, Inc., ConturaSeries® Surface-mounted Multi-Roll Toilet Tissue Dispenser, Product #B-4288.
 1. Finish: Satin-Finish Type #304 Stainless Steel. Surface-mounted Multi-Roll Toilet Tissue Dispenser shall be type 304 stainless steel with all welded construction, including dispensing mechanism, inner housing, and cam; exposed surfaces shall have satin finish. Front of toilet tissue dispenser door shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a flush tumbler lock keyed like other Bobrick washroom accessories. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" (133 mm) diameter (1800 sheets). Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant heavy-duty, one-piece, molded ABS spindles. Install per manufacturer's written instructions.

2.5 STAINLESS STEEL SANITARY NAPKIN DISPOSAL

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

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1. Bobrick Washroom Equipment, Inc.
2. Bradley Corporation
3. Foundations Worldwide, Inc.
4. **Or equal if and as specifically approved by Architect by Addendum during the bidding period.**

- C. Bobrick Washroom Equipment, Inc., ConturaSeries® Surface-mounted Sanitary Napkin Disposal, Product #B-270.

1. Finish: Satin-Finish Type #304 Stainless Steel. Surface-mounted Sanitary Napkin Disposal shall be type 304 stainless steel with all welded construction, exposed surfaces shall have satin finish. Cover shall be drawn, one-piece, seamless construction and secured to container with a full-length stainless steel piano hinge. Container shall have integral finger depression or opening cover. Install per manufacturer's written instructions.

2.6 SEAT PROTECTOR (SP-1)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation
 3. Foundations Worldwide, Inc.
 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Bobrick Washroom Equipment, Inc., ClassicSeries® Surface-mounted Seat cover Dispenser, Product #B-221.

2.7 GRAB BARS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation
 3. Foundations Worldwide, Inc.
 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

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- C. Bobrick Washroom Equipment, Inc., Stainless Steel, 1-1/2" (38 mm) diameter Grab Bar with 2" Snap End Flange, Product #B-6806.99.
1. 18-gauge, 1-1/2" (38 mm) diameter grab bar. Clearance between the grab bar and wall shall be 1-1/2" (38 mm). Concealed mounting flanges shall be 1/8" (3 mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80 mm), and equipped with two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8 mm), 3-1/4" (85 mm) diameter x 1/2" (13 mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with barrier-free accessibility guidelines (including ADAAG in the U.S.A.) for structural strength. Finish: Satin-Finish Type #304 Stainless Steel.
 - a. 12" Grab Bar: #B-6806.99x12.
 - b. 18" Grab Bar: #B-6806.99x18.
 - c. 24" Grab Bar: #B-6806.99x24.
 - d. 30" Grab Bar: #B-6806.99x30.
 - e. 36" Grab Bar: #B-6806.99x36.
 - f. 42" Grab Bar: #B-6806.99x42.
 - g. 48" Grab Bar: #B-6806.99x48.

2.8 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Plumberex Specialty Products, Inc.
 2. Truebro by IPS Corporation.
 3. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 2. Material and Finish: Antimicrobial, molded plastic, white.

2.9 MOP AND BROOM HOLDER (CUSTODIAL ACCESSORIES)

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

TOILET AND BATH ACCESSORIES

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1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.

C. Mop and Broom Holder:

1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
2. Length: 36 inches (914 mm).
3. Hooks: Three.
4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
 - b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.10 FRAMED MIRROR (M-1)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of 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. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation
 3. Foundations Worldwide, Inc.
 4. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- C. Bobrick Washroom Equipment, Inc., Channel Frame, Product #B-165 2436

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2.11 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of **[six]** <Insert number> keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

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SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguishers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. 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.
- B. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.6 SEQUENCING

- A. Apply decals on field-painted fire-protection cabinets after painting is complete.

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PART 2 - PRODUCTS

2.1 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.

2.2 FIRE-PROTECTION CABINET (FEC-1)

- A. Cabinet Type: Suitable for standard 10 lb fire extinguisher.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Cabinet Construction: Nonrated
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Stainless Steel.
- D. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Stainless Steel.
- G. Door Style: Vertical duo 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 projecting door pull and friction latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:

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1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

K. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Factory primed for field painting.
2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
 3. Prepare doors and frames to receive locks.
 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's 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.

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- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semi-recessed fire-protection cabinets.
 - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification: Apply decals, 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.

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- 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 10 44 13

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SECTION 12 35 53 – STAINLESS STEEL LABORATORY CASEWORK

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. Stainless steel laboratory casework
2. Stainless Steel filler and closure panels.
3. Stainless steel countertops.
4. Shelves.
5. Laboratory sinks.
6. Laboratory accessories.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring laboratory casework.
2. Section 09 22 16 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring laboratory casework.
3. Section 09 65 13 "Resilient Base and Accessories" for resilient base applied to metal laboratory casework.
4. Section 11 53 13 "Laboratory Fume Hoods" for fume hoods, including base cabinets and countertops under fume hoods.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.

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- B. Coordinate installation of laboratory casework with installation of fume hoods and other laboratory equipment.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For laboratory casework. Include plans, elevations, sections, and attachment details.
 - 1. Indicate types and sizes of cabinets.
 - 2. Indicate locations of hardware.
 - 3. Indicate locations and types of service fittings.
 - 4. Indicate locations of blocking and reinforcements required for installing laboratory casework.
 - 5. Include details of support framing system.
 - 6. Include details of exposed conduits, if required, for service fittings.
 - 7. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
 - 8. Include coordinated dimensions for laboratory equipment specified in other Sections.
- C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples for Verification: For each type of cabinet finish and each type of countertop material, in manufacturer's standard sizes.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard.
- C. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical and physical resistance.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

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1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 M.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, utility roughing-in and wet work are complete and dry, and temporary HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Kewaunee Scientific Corporation; Laboratory Products Group.
 2. Jamestown Metal Products Inc.
 3. Mott Manufacturing Ltd.
 4. H2I Group
 5. Or equal if and as specifically approved by Architect by Addendum during the bidding period.
- B. Source Limitations: Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.
- C. Product Designations: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with Specifications may be considered.

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2.2 CASEWORK, GENERAL

- A. Casework Product Standard: Comply with SEFA 8 M, "Laboratory Grade Metal Casework."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 METAL CABINET AND TABLE MATERIALS

- A. Metal: Mild, cold-rolled and leveled #304 stainless steel. (#4 polished sheen on all exposed surfaces).
- B. Nominal Metal Thickness:
 - 1. Sides, Ends, Fixed Backs, Bottoms, Tops, Soffits, and Items Not Otherwise Indicated: 0.048 inch (1.21 mm). Except for flammable liquid storage cabinets, bottoms may be 0.036 inch (0.91 mm) if reinforced.
 - 2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.036 inch (0.91 mm) except 0.048 inch (1.21 mm) for back panels and doors of flammable liquid storage cabinets and for unreinforced shelves more than 36 inches (900 mm) long.
 - 3. Intermediate Horizontal Rails, Table Aprons and Cross Rails, Center Posts, and Top Gussets: 0.060 inch (1.52 mm).
 - 4. Drawer Runners, Sink Supports, and Hinge Reinforcements: 0.075 inch (1.90 mm).
 - 5. Leveling and Corner Gussets: 0.105 inch (2.66 mm).

2.4 AUXILIARY CABINET MATERIALS

- A. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

2.5 METAL CABINETS AND TABLES

- A. Fabrication: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Except where otherwise specified, integrally frame and weld cabinet bodies to form dirt- and vermin-resistant enclosures. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).

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- B. Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.
- C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.
- D. Hinged Doors: Mortise for hinges and reinforce with angles welded inside inner pans at hinge edge.
- E. Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Provide drawers with rubber bumpers, polymer roller slides, and positive stops to prevent metal-to-metal contact or accidental removal.
- F. Adjustable Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels.
- G. Toe Space: Fully enclosed, 4 inches (100 mm) high by 3 inches (75 mm) deep, with no open gaps or pockets.
- H. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.
 - 1. Provide base cabinets with removable backs for access to utility space.
- I. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges unless otherwise indicated.
 - 1. Provide knee-space panels (modesty panels) at spaces between base cabinets, where indicated. Fabricate from back-to-back panels or of hollow construction to eliminate exposed hemmed or flanged edges.
 - 2. Provide utility-space closure panels at spaces between base cabinets where utility space would otherwise be exposed, including spaces below countertops.
 - 3. Provide closure panels at ends of utility spaces where utility space would otherwise be exposed.

2.6 HARDWARE

- A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.
- B. Hinges: Stainless-steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two for doors 48 inches (1200 mm) high or less and three for doors more than 48 inches (1200 mm) high.

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- C. Hinged Door and Drawer Pulls: Stainless-steel back-mounted pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.
1. Design: Wire pulls.
 2. Overall Size: 1-1/4 by 4-1/2 inches (32 by 114 mm).
- D. Door Catches: Nylon-roller spring catches. Provide two catches on doors more than 48 inches (1200 mm) high.
- E. Ball Bearing Drawer Slides:
1. Acceptable Manufacturers:
 - a. Base:
 - 1) Accuride.
 - b. Optional:
 - 1) Waterloo Furniture Components Inc.
 - 2) Fulterer USA
 - 3) Or equal if and as specifically approved by Architect by Addendum during the bidding period.
 2. Typical Drawers:
 - a. Satisfy ANSI/BHMA Grade 1 HD requirements.
 - b. Basis of Design:
 - 1) For drawer widths up to 460mm 18 IN: Accuride 4033 (light-duty polymer ball bearings).
 - 2) For drawer widths greater than 460mm 18 IN and up to 685mm 27 IN: Accuride 4032 (medium duty stainless steel ball bearings).
 - 3) For drawer widths greater than 685mm 27 IN and up to 1065mm 42 IN: Accuride 930.
 - c. Full extension.
 - d. Dynamic Load Rating: 45 kg/pair 100 LB/PAIR capacity, minimum.
 3. Base Metal:
 - a. Sheet metal to match cabinet construction.
- F. Label Holders: Stainless steel; sized to receive standard label cards approximately 1 by 2 inches (25 by 50 mm), attached with screws or rivets. Provide on all drawers.
- G. Locks: Cam or half-mortise type with five-pin tumbler, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281, Type E07111, or Type E07021.

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1. Provide a minimum of two keys per lock and two master keys.
2. Provide where indicated
3. Keying: Key locks as directed.
4. Master Key System: Key all locks to be operable by master key.

2.7 COUNTERTOPS, TABLETOPS, SHELVES, TROUGHES, AND SINKS

- A. **Stainless-Steel Countertops:** Made from stainless-steel sheet, not less than 0.062-inch (1.59-mm) nominal thickness, with No. 4 satin finish.
1. Extend top down 1 inch (25 mm) at edges with a 1/2-inch (13-mm) return flange under frame. Apply heavy coating of heat-resistant, sound-deadening mastic to undersurface.
 2. Form backsplash coved to and integral with top surface.
 3. Provide raised (marine) edge where indicated.
 4. Pitch countertops containing sinks two ways to sink, without channeling or grooving.
 5. Factory punch holes for service fittings.
 6. Reinforce underside of countertop with channels, or use thicker metal sheet where necessary to ensure rigidity without deflection.
 7. Weld shop-made joints.
 8. Where field-made joints are required, provide hairline butt joints mechanically bolted through continuous channels welded to underside at edges of joined ends. Keep field jointing to a minimum.
 9. Where stainless-steel sinks or cup sinks occur in stainless-steel countertops, factory weld into one integral unit.
 10. After fabricating and welding, grind surfaces smooth, and polish as needed to produce uniform, directionally textured finish with no cross scratches or evidence of welds. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
- B. **Stainless-Steel Shelves:** Made from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness, with No. 4 satin finish. Weld shop-made joints. Fold up front edge 3/4 inch (19 mm); fold up back edge 3 inches (75 mm). Provide integral stiffening brackets, formed by folding up ends 3/4 inch (19 mm) and welding to upturned front and back edges. After fabricating, grind welds smooth, and polish as needed to produce uniform, directionally textured finish with no cross scratches or evidence of welds. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
- C. **Stainless-Steel Sinks:** Made from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope sink bottoms to outlet. Provide double-wall construction for sink partitions, with top edge rounded to at least 1/2-inch (13-mm) diameter. Provide continuous butt-welded joints. After fabricating and welding, grind surfaces smooth, and polish as needed to produce uniform finish with no cross scratches or evidence of welds. Passivate and rinse surfaces; remove embedded foreign matter and leave surfaces clean.
1. Factory punch holes for fittings.
 2. Provide with stainless-steel strainers and tailpieces.

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3. Provide with integral rims except where located in stainless-steel countertops.
4. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

- A. Comply with installation requirements in SEFA 2.3. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:
 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet (1.5 mm in 3 m).
 2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet (3 mm in 3 m).
 3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet (3 mm in 3 m).
 4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch (0.8 mm).
 5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch (1.5 mm).
- B. Base Cabinets: Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions, with fasteners spaced not more than 16 inches (400 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
 1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than two fasteners per side.
- C. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 16 inches (400 mm) o.c.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- E. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

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3.3 INSTALLATION OF COUNTERTOPS

- A. Comply with installation requirements in SEFA 2.3. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where indicated on Shop Drawings.
- B. Field Jointing: Where possible, make in same manner as shop-made joints, using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Shop prepare edges for field-made joints.
 - 1. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.
- C. Provide required holes and cutouts for service fittings.
- D. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- E. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF SINKS

- A. Comply with installation requirements in SEFA 2.3.
- B. Semiflush Installation of Stainless-Steel Sinks: Before setting, apply sink and countertop manufacturers' recommended sealant under rim lip and along top. Remove excess sealant while still wet and finish joint for neat appearance.

3.5 INSTALLATION OF LABORATORY ACCESSORIES

- A. Install accessories according to Shop Drawings, installation requirements in SEFA 2.3, and manufacturer's written instructions.
- B. Securely fasten adjustable shelving supports, stainless-steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.
- C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.
- D. Securely fasten pegboards to partition framing, wood blocking, or reinforcements in partitions.

Contract Documents

UM Project No.: CP230851

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3.6 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- B. Protect countertop surfaces during construction with 6-mil (0.15-mm) plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches (1200 mm) o.c.

END OF SECTION 12 35 53