

Jones Gillam Renz Architects

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Project Manual

for

HILLSBORO COMMUNITY CHILD CARE CENTER REHABILITATION Hillsboro, KS

March 21, 2024

JGR Project No. 22-3225RE

Community Development Block Grant Project #23-PF024

HILLSBORO COMMUNITY CHILD CARE CENTER REHABILITATION HILLSBORO, KANSAS

Project No. 22-3225RE

DATE OF DRAWINGS AND SPECIFICATIONS	March 21, 2024
OWNER	HILLSBORO COMMUNITY CHILD CARE CENTER Tristen Cope 118 W. Grand, Hillsboro, KS 67063 620 382 2325
ARCHITECT	JONES GILLAM RENZ ARCHITECTS, INC Charles A. Renz, Project Architect 730 N. 9 th Street Salina, KS 67401 785 827 0386 Fax 785 827 0392
STRUCTURAL ENGINEERS	BOB D. CAMPBELL & CO. Chris Beverlin, P. E. 4338 Belleview, Kansas City, MO 64111 816 531 4144
MECHANICAL/ELECTRICAL	LST CONSULTING ENGINEERS, INC. John Lewis Smith, P.E 4809 Vue Du Lac Pl, Ste 201, Manhattan, KS 66503 785 587 8042 Fax 785 587 8039
FOOD SERVICE	SUNFLOWER RESTAURANT SUPPLY Phillip Schmidt 1647 Sunflower Lane, PO Box 1277 Salina, KS 67402-1277 785 823 6394 Fax 785 823 5512

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NOTE: Entire set of documents should be sent to all bidders, but bidders complete only Part I. Part II must be completed by the successful Contractor.

ADVERTISEMENT FOR BIDS

PROJECT NO: <u>23-PF-024</u>

OWNER: City of Hillsboro, 118 E. Grand, Hillsboro, KS 67063

NOTE: A PRE-BID MEETING WILL BE HELD on <u>Tuesday, April 2, 2024</u>, at <u>2:00 PM</u> at the building site (211 Elm Street, Hillsboro, KS).

Separate sealed bids for <u>Hillsboro Childcare Center located at 211 Elm Street</u>, <u>Hillsboro</u>, KS.

Will be received by <u>Mayor and City Council.</u>

At the office of <u>City Hall-Council Meeting Room located at 118 E. Grand, Hillsboro,</u> <u>Kansas</u> until <u>2:00 PM</u> CST on <u>Wednesday, April 10, 2024</u>.

Then at said office publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond, Performance and Payment Bond, and other Contract Documents may be examined at the following:

Jones Gillam Renz Architects, 730 N. Ninth Street Salina, KS67401

City of Hillsboro, Kansas (address listed above)

Copies may be obtained at the office of <u>Jones Gillam Renz Architects</u> located at <u>730 N. Ninth Street, Salina, KS</u> upon payment of \$250.00 for each set. Any unsuccessful bidder, upon returning such a set promptly and in good condition, will be refunded his payment, and any non-bidder upon returning such a set will be refunded \$250.00.

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

Each bidder must deposit with his bid, security in the amount, form and submit to the conditions provided in the Information for Bidders.

Attention of bidders is particularly called to the requirements as to conditions of employment to be observed and Federal; prevailing wage rates to be paid under the contract, Section 3 of the 1968 Housing Act, Segregated Facility, Section 109 of the 1984 Housing and Community Development Act and Executive Order11246 and the Civil Rights Act of 1964.

No Bidder may withdraw his bid within thirty (30) days after the actual date of the opening thereof.

Lou Thurston, Mayor

(Date)

INFORMATION FOR BIDDERS

1. <u>Receipt and Opening of Bids</u>

The <u>City of Hillsboro</u> (herein called "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received

by the Owner at the <u>City Hall-Council Meeting Room located at 118 E. Grand, Hillsboro, KS 67063</u> until <u>2:00</u> o'clock (A.M. P.M. S.T.) <u>Wednesday, April 10, 2024</u> and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to <u>City of Hillsboro, 118 E. Grand, Hillsboro, KS 67063</u>

_ and designated as bid for <u>Hillsboro Childcare Center</u>

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 30 days after the actual date of the opening thereof.

- 2. <u>Preparation of Bid</u>: Each bid must be submitted on the prescribed form and accompanied by Certification by Bidder Regarding Equal Employment Opportunity, Form HUD-950.1, Certification by Bidder (Contractor) concerning Labor Standards and Prevailing Wage Requirements, Form HUD-1422, and Certification of Bidder Regarding Section 3 and Segregated Facilities. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures, and the foregoing Certifications must be fully completed and executed when submitted.
- 3. <u>Subcontracts</u>: The bidder is specifically advised that any person, for, or other party to whom it is proposed to award a subcontract under this contract:
 - a. Must be acceptable to the owner after verification by the Kansas Department of Commerce office of the current eligibility status; and,
 - b. Approval of the proposed subcontract award cannot be given by the Owner unless and until the proposed subcontractor has submitted the Certifications and/or other evidence showing that it has fully complied with any reporting requirements to which it is or was subject. Although the bidder is not required to attach such Certifications by proposed subcontractors to his/her bid, the bidder is here advised of this requirement so that appropriate action can be taken to prevent subsequent delay in subcontract awards.
- 4. <u>Telegraphic Modification:</u> Any bidder may modify his/her bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic modification.
- 5. <u>Method of Bidding:</u> The Owner invites the following bid(s) to be delivered to bid opening location.

- 6. <u>Qualifications of Bidder</u>: The Owner may make such investigations as she/he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.
- 7. <u>Bid Security</u>: Each bid must be accompanied by cash, certified check of the bidder, or a bid bond prepared on the form of bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of 5% of the bid. Such cash, checks or bid bonds will be returned to all except the three lowest bidders within three days after the opening of bids, and the remaining cash, checks or bid bonds will be returned promptly after the Owner and the accepted bidder have executed the contract, or, if no award demand of the bidder at any time thereafter, so long as she/he has not been notified of the acceptance of his/her bid.
- 8. <u>Liquidated Damages for Failure to Enter into Contract</u>: The successful bidder, upon his/her failure or refusal to execute and deliver the contract and bonds required within 10 days after she/he received notice of the acceptance of his/her bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his/her bid.

<u>Time of Completion and Liquidated Damages</u>: Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within <u>365</u> consecutive calendar days thereafter. Bidder must agree also to pay as liquidated damages, the sum of <u>500</u> for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

- 9. <u>Conditions of Work</u>: Each bidder must inform him/herself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his/her obligation to furnish all material and labor necessary to carry out the provisions of his/her contract. Insofar as possible the contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.
- 10. <u>Addenda and Interpretations</u>: No interpretation of the meaning to the plans, specifications, or other prebid documents will be made to any bidder orally.

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at Jones Gillam Renz Architects at crenz@jgrarchitects.com a	ina
to be given consideration must be received at least five days prior to the date fixed for the opening of	
bids. Any and all such interpretations and any supplemental instructions will be in the form of written	
addenda to the specifications which, if issued, will be mailed by certified mail with return receipt request	ed
to all prospective bidders (at the respective addresses furnished for such purposes), not later than three	е
days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum	n
or interpretation shall not relieve such bidder from any obligation under his/her bid as submitted. All	
addenda so insured shall become part of the contract documents.	

11. <u>Security for Faithful Performance</u>: Simultaneously with his/her delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.

- 12. <u>Power of Attorney</u>: Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.
- 13. <u>Notice of Special Conditions</u>: Attention is particularly called to those parts of the contract documents and specifications which deal with the following:
 - a. Inspection and testing of materials.
 - b. Insurance requirements.
 - c. Wage rates.
 - d. Stated allowances.
- 14. <u>Laws and Regulations</u>: The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.
- 15. <u>Method of Award Lowest Qualified Bidder</u>: If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds then estimated by the Owner as available to finance the contract, the contract will be awarded on the base bid only. If such bid exceeds such amount, the Owner may reject all bids or may award the contract on the base bid combined with such deductible alternates applied in numerical order in which they are listed in the Form of Bid, as produces a net amount which is within the available funds.
- 16. <u>Obligation of Bidder</u>: At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.
- 17. <u>Safety Standards and Accident Prevention</u>: With respect to all work performed under this contract, the contractor shall:
 - a. Comply with the safety standards provisions of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "Federal Register", Volume 36, No. 75, Saturday, April 17, 1971.
 - b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.
 - c. Maintain a t his/her office or other well-known place at the job site, all articles necessary for giving first aid to the injured, and shall make arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.
- 18. Projects funded through the CDBG Program are subject to Davis-Bacon Act Regulations. Contractors are required to pay prevailing wage rates to all laborers and mechanics employed on CDBG funded projects.
- 19. Contractor shall, if requested by the Owner, submit a detailed Schedule of Values stating the breakout of construction costs, identifying both labor and material. Schedule of Values shall be submitted within 72 hours of the bid opening.

BID BOND

KNOW ALL MEN	BY THESE PRESENTS, that we, the ur	ndersigned,	
as Principal, and		as Surety, are hereby held and firm	ly bound unto
-	as owner in the penal sum of	· · · · · ·	
for the payment of	which, well and truly be made, we here	by jointly and severally bind ourselves,	our heirs,
executors, administrators, successors and assigns, thisday of, 20,			
	-		

NOW, THEREFOR,

- a. If said Bid shall be rejected, or in the alternate,
- b. If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Formof Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, shall in all other respects perform the agreement created by the acceptance of said Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by the extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

	(L.S.)
Principal	

SEAL

Ву: _____

BID FOR LUMP SUM CONTRACTS

	Place Date Project No.	
Proposal of		(hereinafter called "Bidder") corporation/a partnership/an individual (STRIKE OUT INAPPLICABLE TERMS)
		(hereinafter called "Owner")
Gentlemen:		
The bidder, in compliance with your invitation for bids f	or the construct	ion of a
Building rehabilitation to convert former church building to a new ch	ildcare center.	
having examined the plans and specification with relate familiar with all of the conditions surrounding the constr material and labor, hereby proposes to furnish all labor accordance with the Contract Documents, within the tir prices are to cover all expenses incurred in performing this proposal is a part.	ed documents a ruction of the pro , materials, and ne set forth ther the work require	nd the site of the proposed work, and being oposed project including the availability of supplies; and to construct the project in rein, and at the prices stated below. These ed under the Contract Documents, of which
Bidder hereby agrees to commence work under this co "Notice to Proceed" of the Owner and to fully complete	ontract on or before the project withi	ore a date to be specified in written $\frac{365}{2}$

consecutive calendar days thereafter as stipulated in the specifications. Bidder further agrees to pay as liquidated damages, the sum of \$ 500.00 for each consecutive calendar day thereafter as hereinafter provided in Paragraph 19 of the General Conditions. Bidder

acknowledges receipt of the following addendums (mark w/ "X"):

Addendum 1	Addendum 3
Addendum 2	Addendum 4

BASE PROPOSAL: Bidder agrees to perform all of the <u>General Construction, Structural, Mechanical,</u> <u>Plumbing, Electrical, Food Service, and Exterior</u> work described in the specifications and shown

ALTERNATE PROPOSALS:

Alternate No. 1:	Eliminate New Front Office Addition
Deduct the sum of	(\$)
Alternate No. 2:	New Concrete Parking Lot
Add the sum of	(\$)
Alternate No. 3:	Ceiling Tile Replacement B25, B07, B40
Add the sum of	(\$)
Alternate No. 4:	Ceiling Tile Replacement B02,B03,B04,B08,B14,B16,B22,B23,B29,B31,B37,B38,B42
Add the sum of	(\$)
Alternate No. 5:	Provide and Install Reception Desk
Add the sum of	(\$)
Alternate No. 6:	Install Concrete Playground Base
Add the sum of	(\$)
Alternate No. 7:	Install suspended ceiling & adding clouds with axiom trim in rooms 143,156, &158
Add the sum of	(\$)
Alternate No. 8:	Provide and install the climbing wall
Add the sum of	(\$)
Alternate No. 9:	If added by Addendum
Add the sum of	(\$)

UNIT PRICES:

For changing quantities of work items from those indicated by the contract drawings upon written instructions from the architect/engineer, the following unit prices shall prevail:

1.	Earth Over-Excavation	\$ / cubic yard
2.		\$
3.		\$

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for. Changes shall be processed in accordance with Paragraph 17(a) of the General Conditions.

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

The bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the acceptance of this bid, Bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by Paragraph 29 of the General Conditions.

The bid security attached in the sum of	(\$
is to become, in the event the contract and bond are not e	executed within the time above set forth, as liquidated
damages for the delay and additional expense to the Own	ner caused thereby.

)

Respectfully submitted:

(SEAL – if bid is by a corporation)

Signature

Title

Business Address and Zip Code

Contractor's Requirements

By:

- The Prime Contractor must submit a Section 3 plan to the Sub-Recipient outlining Section 3 hiring and employment opportunities.
- The Prime Contractor must notify all sub-contractors of their responsibilities under Section 3
- The Prime Contractor must provide a permeant workforce breakdown of all current employees and identify those Section 3 workers that were hired within the last five years.
- The Prime Contractor must provide an estimated breakdown of potential hires for the awarded project and timeline of anticipated hiring
- The Prime Contractor must refrain from contracting with sub-contractors as to whom they have received notice or have knowledge that the sub-contractors have been found in violation of the regulations in 24 CFR 75.
- Maintain records that document a good faith effort to utilize Section 3 workers and Target Section 3 workers as trainees and employees. (Required of both contractor and sub- contractor.) and any other qualitative efforts to comply with Section 3.

Recordkeeping requirements for recipients are found at 24 CFR § 75.31. The contractor is required to maintain documentation to demonstrate compliance with the regulations and is responsible for requiring their subcontractors to maintain or provide any documentation that will assist recipients in demonstrating compliance, including documentation that shows hours worked by Section 3 workers and Targeted Section 3 workers.

CERTIFICATION OF BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS

This certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause: and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the bidder has not filed a compliance report due under applicable instructions, such bidder shall be required to submit a compliance report within seven calendar days after bid opening. No contract shall be awarded unless such report is submitted.

		CERTIFICA	TION BY BIDDE	ER	
Bidder	Name				
Addres	s			- .	
City		State		ZIP	
1.	Bidder has part	icipated in a previous contract	or subcontract s	subject ot the Equal Opportunity Clause.	
	□Yes	🗌 No			
2.	Compliance rep	ports were required to be filed	n connection wit	th such contract or subcontract.	
	□Yes	🗌 No			
3.	Bidder has filed	l all compliance reports due ur	der applicable ir	nstructions.	
	∐Yes	□ No			
4.	Have you ever as amended?	been or are you being conside	red for sanction	due to violation of Executive Order 1124	46,
	Yes	No			
Signer Title	Name				

SIGNATURE

DATE

CERTIFICATION OF BIDDER REGARDING SECTION 3 AND SEGREGATED FACILITIES

Name of Proposed Contractor

Project Name & Number

The undersigned hereby certifies that:

a. Section 3 provisions are included in the Contract.

b. A written Section 3 plan was prepared and submitted as part of the bid proceedings

c. No segregated facilities will be maintained.

Signer Name

Title

SIGNATURE

DATE

CONTRACTOR SECTION 3 PLAN

(Contractor) agrees to implement affirmative steps to comply with the Section 3 requirements set forth at 24 CFR 75 directed at increasing the utilization of lower income residents and businesses within the City or County of _____.

- A. To implement Section 3 requirements by seeking the assistance of local officials in determining the exact boundaries of the applicable project area.
- B. To attempt to recruit from within the City/County the necessary number of lower income residents through local advertising media, signs placed at the proposed site for the project, and community organizations and public or private institutions operating within or serving the project area.
- C. To maintain a list of all lower income residents who have applied either on their own or on referral from any source, and to employ such persons, if otherwise eligible and if a vacancy exits.
- D. To insert this Section 3 plan in all bid documents, and to require all bidders to submit a Section 3 affirmative action plan including utilization goals and the specific steps planned to accomplish these goals.
- E. To formally contact unions, subcontractors and trade associations to secure their cooperation for this program.
- F. To maintain records, including copies of correspondence, memoranda, etc., which document that all the above affirmative action steps have been taken.
- G. To appoint or recruit an executive official of the company or agency as Equal Opportunity Officer to coordinate the implementation of this Section 3 plan.
- H. To list all permanent workforce for this project by job title.
- I. To list all projected workforce needs for this project by job classification and time frame for potential hire.

As officers and representatives of ______(Name of Bidder) We, the undersigned, have read and fully agree to the above and become a party to the full implementation of this program.

Signature

Title

Date

Contractor Permanent Workforce Form

Form A1

This form is used to determine the Section 3 Workers already employed by the bidding contractor. Section 3 Worker Certification (Form A2) is needed for all employees working on site.

Employee Name	Job Title	Certified Section 3 Worker		Monthly Salary	Sal Bel 80% Mec	ary ow 6 of dian
		YES	NO		YES	NO

I certify the above employees are permanent employees of _______. I certify the above employees are on our regular monthly payroll and have their W-2 tax forms for our records. These records will be available to the city/county for the above referenced project for verification purposes. I understand that falsifying information is perjury and subject to legal ramifications.

Print Name

Section 3 Worker Certification Form A2

A Section 3 Worker seeking the preference in training and employment provided by this part shall certify or submit evidence to the recipient contractor or subcontractor that the person is a Section 3 Worker, as defined in Section 24 CRF 75.

Worker Name: _____

Household Income Guidelines:

Place a check mark beside the number of people in your (the worker's) household.

Place Check	Household/ Family Size	Income Limit
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	

Income limits can be found at https://www.huduser.gov/portal/datasets/il.html

Place a check mark beside any of the following that apply below:

My income for the previous year was below the amount next to the household/family size I checked on the table above.

I am employed by a Section 3 business concern.

I am a Youthbuild participant.

I hereby certify that the information provided by me to be true and correct and understand any falsification of any of the information could subject me to disqualification from participation.

Signature

Date

Section 3 Business Concern Certification Form Form B1

To Self-Certify as a Section 3 Business your company/firm per 24 CFR 75, must meet one of the listed categories below. You must provide that supporting documentation with this form to be properly and completely confirmed as a Section 3 business.

Section 3 Business Category	Additional Required Data	Mark an "X" on Your Election
It is at least 51 percent owned by low- or very low-income persons;	Proof of ownership showing all owners and their percentages and a completed Section 3 Self-Certification form for all low- and very low-income owners	
Over 75 percent of the labor hours performed for the business are performed by low- or very low- income persons; or	Provide the last 90 days full payrolls for the entire company, make a list of the names from the payrolls of the Section 3 workers, and provide a completed Section 3 Individual Self- Certification for all low- and very low-income workers you list	
It is a business at least 51 percent owned by current public housing residents or residents who currently live in Section 8- assisted housing.	Proof of ownership showing all owners and their percentages and a Section 3 Worker Self Certification form for all public housing and/or Section 8 owners	

I hereby certify to the US Department of Housing and Urban Development (HUD) that all of the information on this form is true and correct. I attest under penalty of perjury that my business meets the elected definition and understand proof of this information may be requested. If found to be inaccurate, I understand that I may be disqualified as a certified Section 3 business

Signature:	_ Date Signed:
Print Name:	Title:
Company Name:	-
Address:	
Telephone Number:	

Section 3 Business Owner Certification Form B2

A business owner seeking Section 3 Business Certification shall certify and submit this form in conjunction with the Section 3 Business Self-Certification form.

Owner Name: _____

Percent Ownership of Business: _____

Household Income Guidelines:

Place a check mark beside the number of people in your (the owner's) household.

Place Check	Household/ Family Size	Income Limit
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	

Income limits can be found at https://www.huduser.gov/portal/datasets/il.html

Place a check mark beside any of the following that apply below:

My income for the previous year was below the amount next to the household/family size I checked on the table above.

I am currently a resident of public housing or live in Section 8 assisted housing.

I hereby certify that the information provided by me to be true and correct and understand any falsification of any of the information could subject me to disqualification from participation.

Employee Signature

Date

Safe Harbor Compliance Form Form E

Additional reporting if Section 3 benchmarks are not met. If the recipient's reporting under paragraph (a) of this section indicates that the recipient has not met the Section 3 benchmarks described in § 75.23, the recipient must report in a form prescribed by HUD on the qualitative nature of its activities and those its contractors and subcontractors pursued. Such qualitative efforts may, for example, include but are not limited to the following:

□ Engaged in outreach efforts to generate job applicants who are Targeted Section 3 workers.

 $\hfill\square$ Provided training or apprenticeship opportunities.

□ Provided technical assistance to help Section 3 workers compete for jobs (e.g., resume assistance, coaching).

□ Provided or connected Section 3 workers with assistance in seeking employment including: drafting resumes, preparing for interviews, and finding job opportunities connecting residents to job placement services.

 $\hfill\square$ Held one or more job fairs.

□ Provided or referred Section 3 workers to services supporting work readiness and retention (e.g., work readiness activities, interview clothing, test fees, transportation, child care).

□ Provided assistance to apply for/or attend community college, a four-year educational institution, or vocational/technical training.

 $\hfill\square$ Assisted Section 3 workers to obtain financial literacy training and/or coaching.

 $\hfill\square$ Engaged in outreach efforts to identify and secure bids from Section 3 business concerns.

 \Box Provided technical assistance to help Section 3 business concerns understand and bid on contracts.

□ Divided contracts into smaller jobs to facilitate participation by Section 3 business concerns.

□ Provided bonding assistance, guaranties, or other efforts to support viable bids from Section 3 business concerns.

□ Promoted use of business registries designed to create opportunities for disadvantaged and small businesses.

 \Box Outreach, engagement, or referrals with the state one-stop system as defined in Section 121(e)(2) of the Workforce Innovation and Opportunity Act.

Other: _____

Business Owner or Designee Name (Print)

Date

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM CONTRACTOR'S CERTIFICATION

CONCERNING LABOR STANDARDS AND PREVAILING WAGE REQUIREMENTS

To (Appropriate Recipient)		Date
		Project No. (if any)
c/o		Project Name
1.	The undersigned, having executed a contract with of the above-identified project, acknowledges that:	for the construction

- a. The Labor Standards provisions are included in the aforesaid contract.
- b. Correction of any infractions of the aforesaid condition, including infractions by any of his subcontractors and any lower tier subcontractors, is his responsibility.
- 2. He certifies that:
 - a. Neither he nor any firm, partnership or association in which he has substantial interest is designated as an ineligible contractor by the Comptroller General of the United States pursuant to Section 5.6(b) of the Regulations of the Secretary of Labor, Part 5 (29 CFR, Part 5) or pursuant to Section 3(a) of the Davis-Bacon Act, as amended (40 U.S.C. 476a-2(a)).
 - b. No part of the aforementioned contract has been or will be subcontracted to any subcontractor if each subcontractor or any firm, corporation, partnership or association in which such subcontractor has a substantial interest is designated as an ineligible contractor pursuant to any of the aforementioned regulatory or statutory provisions.
- 3. He agrees to obtain and forward to the aforementioned recipient within ten days after the execution of any subcontract, including those executed by his subcontractors and any lower tier subcontractors, a Subcontractor's Certification Concerning Labor Standards and Prevailing Wage Requirements executed by the subcontractors.
- 4. He certifies that:
 - a. The legal name and the business address of the undersigned are:

b.	The undersigned is:				
	1. A SINGLE PRO	PRIETORSHIP	3. A CORPORATION ORGANIZED IN THE STATE OF		
	2. A PARTNERSH	IIP	4. OTHER ORGANIZATION (Describe)		

c. The name, title and address of the owner, partners or officers of the undersigned are:

NAME		TITLE	ADDRESS
d.	The names and address interest in the undersigne	es of all other persons, both ed, and the nature of the inte	natural and corporate, having a substantial rest are (if none, so state):
NAME		ADDRESS	NATURE OF INTEREST
e.	The nameS, addresses a which the undersigned h	and trade classifications of al as a substantial interest are	l other building construction contractors in (if none, so state):
NAME		ADDRESS	TRADE CLASSIFICATION
	Contractor		
	By:		
	Signature		Date

WARNING

U.S. Criminal Code, Section 1010, Title 18, U.S.C., provides in part: "Whoever....makes, passes, writes or publishes any statement, knowing the same to be false.....shall be fined not more than \$5,000 or imprisoned not more than two years, or more."

COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM **GRANT REGULATIONS**

BONDING AND INSURANCE REQUIREMENTS

A state or local unit of government receiving a grant from the Federal government, which requires contracting for construction or facility improvements, shall follow Federal bonding requirements on all contracts exceeding \$100,000. For contracts between \$25,000 - \$100,000 some form of bonding security is also required. For contract under \$25,000 the State CDBG program recommends some form of security such as a Certificate of Deposit or a line of credit from a lending institution.

For Contracts or subcontracts exceeding \$100,000, the Federal agency may accept the bonding policy and requirements of the grantee provided the Federal agency has made a determination that the Government's interest is adequately protected. If such a determination has not been made, the minimum requirements shall be as follows:

- a. A bid guarantee from each bidder equivalent to five percent of the bid price. The "bid guarantee" shall consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his/her bid, execute such contractual documents as may be required within the time specified.
- A performance bond on part of the contractor for 100 percent of the contract price. A b. "performance bond" is executed in connection with the contract to secure fulfillment of all contractor's obligations under such contract.
- A payment bond on the part of the contractor for 100 percent of the contract price. A "payment C. bond" is one executed in connection with contract to assure payment as required by law of all person supplying labor and materials in the execution of the work provided for in the contract.

The State of Kansas CDBG program, through adoption of the federal policy and amending it to fit the State's program needs, extends the above bonding requirements to cover all contracts that exceed \$25,000. Allowance is made for local requirements to prevail for contracts between \$25,000 and \$100,000 as long as the bid and the subsequent contract is secured to protect the grantee and the Federal funds. CDBG also recommends some type of security on all construction contracts under \$25,000, such as a line of credit, cash deposit in bank for term of project, etc.

All bonds shall be procured from a surety company registered and licensed to do business in the State of Kansas and countersigned by its Kansas resident agent.

CONSTRUCTION PERFORMANCE BOND

(Insurance company standard equivalent form is acceptable.)

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR				
Name				
Address				
City	State		Zip	
SURETY				
Name and Principal Place of Business	S			
Address				
City	State	9	Zip	
OWNER				
Name				
Address				
City	State		Zip	
CONSTRUCTION CONTRACT				
Date				
Amount				
Description (Name and Location)				
BOND				
Date (Not earlier than the Constructio	n Contract Date): _			
Amount				
Modifications of this Bond Form:				
CONTRACTOR AS PRINCIPAL		SURETY		
Company:	(Corp. Seal)	Company:		(Corp. Seal)
	(1)			
Signature:		Signature:		
Name:		Name:		
Title:		Title:		
CONTRACTOR AS PRINCIPAL		SURETY		
		Company:		(Com Sool)
	(Corp. Seal)	Company.		(Corp. Sear
Signature:		Signature:		
Name:		Name:		—
Title:		Title:		—

EJCDC No. 1910-28A (1984 Edition) Prepared through the joint efforts of The Surety Association of America, Engineers' Joint Contract Documents Committee, The Associated General Contractors of America, and the American Institute of Architects.

- 1. The Contractor and the Surety jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.
- 2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.
- 3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
 - 3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below, that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and
 - 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and
 - 3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a Contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner
- 4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:
 - 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or
 - 4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contracts; or
 - 4.3 Obtain bids or negotiated proposals from qualified Contractor acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or
 - 4.4 Waive its rights to perform and complete, arrange for completion, or obtain a new Contractor and with reasonable promptness under the circumstances:
 - 1. After investigation, determine the amount for which it may be liable to the Owner, and as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
 - 2. Deny liability in whole or in part and notify the Owner citing reasons therefore.
- 5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner shall be entitled to enforce any remedy available to the Owner shall be entitled to enforce any remedy available to the Owner shall be entitled to enforce any remedy available to the Owner.

- 6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be great than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for;
 - 6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
 - 6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
- 7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
- 8. The Surety hereby waives notice of any change, including change of time, to the Construction Contractor to related subcontracts, purchase orders and other obligations.
- 9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses to fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 10. Notice to the Surety, the Owner or the Contract shall be mailed or delivered to the address shown on the signature page.
- 11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
- 12. Definitions
 - 12.1 Balance of the Contractor Price: The total amount payable by the Owner to the Contractor under Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner is settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 12.3 Contractor Default: Failure to the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
 - 12.4 Owner Default: Failure to the Owner, which has neither been remedied not waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

CONSTRUCTION PAYMENT BOND

(Insurance company standard equivalent form is acceptable.)

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR				
Name				
Address				
City	St	ate	Zip	
SURETY				
Name and Principal Place of Busines	s			
Address				
City	St	ate	Zip	
OWNER				
Name				
Address				
City	St	ate	Zip	
CONSTRUCTION CONTRACT				
Amount				
Description (Name and Location)				
BOND				
Date (Not earlier than Construction C	ontract Date):			
Amount	, =			
Modifications to this Bond Form				
CONTRACTOR AS PRINCIPAL		SURETY		
Company:	(Corp. Seal)	Company:		(Corp. Seal)
Signature:		Signature:		
Name:		Name:		
Title:		Title:		
CONTRACTOR AS PRINCIPAL		SURETY		
Company:	(Corp. Seal)	Company:		(Corp. Seal)
Signature:		Signature:		
Name:		Name:		
Title:		Title:		

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- 1. The Contractor and the Surety jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
- 2. With respect to the Owner, this obligation shall be null and void if the Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnities and holds harmless the Owner from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.
- 3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
- 4. The Surety shall have no obligation to Claimants under the Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with the Contractor:
 - 1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
 - 2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
 - 3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner stating that a claim is being made under the Bond and enclosing a copy of the previous written notice furnished to the Contractor.
- 5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
- 6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
 - 6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2 Pay or arrange for payment of any undisputed amounts.

- 7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
- 8. Amounts owed by the owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
- 9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
- 10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontract, purchase orders and other obligations.
- 11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2 (iii), or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
- 13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location wherein construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
- 14. Upon request by any person or entity appearing to be potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.
- 15. DEFINITIONS
 - 15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.
 - 15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 15.3 Owner Default: Failure of the Owner, which has neither been remedied not waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

(FOR INFORMATION ONLY- Name, Address and Telephone) AGENT or BROKER: OWNER'S REPRESENTATIVE (Architect, Engineer, or other party)

SAMPLE COPY - STATUTORY BOND

Two (2) copies of Statutory Bond with Power of Attorney attached shall be furnished to architect prior to start of construction. Wording of Statutory furnished shall be equivalent of the sample on SB-2.
STATUTORY BOND

KNOW ALL MEN BY THESE PRESENTS:

	, a Corpora	ation organized unde	r the laws of the State of
, as Surety are held and firmly	bound unto the S	state of	, in the penal sum of _
Dollars	\$	lawful money of	the United States, for the
payment of which sum well and truly made, sa executors, successors and assignees, jointly	aid Principal and and severally by	Surety bind themselv these presents.	ves, their heirs, administrators,
Signed, sealed and delivered on this	day of	, 20	
THE CONDITION OF THE FOREGOING OB into a written contract with	LIGATION IS SU	CH THAT WHEREA	S said Principal has entered
, hereina	after called the "O	wner" dated	
20, for the construction or markin	g of the following	described improvem	ents:

all in accordance with the detailed Drawings and Specifications on file in the office of the Owner.

NOW THEREFORE, if the said Principal or the Subcontractor, or Sub-Subcontractors, of said Principal shall pay all indebtedness incurred for supplies, materials or labor furnished, used or consumed in connection with, in or about the construction or making of the above described improvements, including gasoline, lubrications, oils, fuel oils, greases, coat and similar items used or consumed directly in furtherance of such improvements, this obligation shall be void, otherwise it shall remain in full force and effect.

The said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or additions to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect any such change, extension of time, alteration or addition to the terms of the Contract or to the Specifications.

(SEAL)

Principal		
By:		
=):		

. as Principal, and

(SEAL)

Surety		
By:		

CONTRACT

THIS AGREEMENT,	made this	day of	, 20	,
by and between				
		(Corporate Name and C)wner)	
Herein through its			, and	t
		(Title of Authorized Of	īcial)	
Corporation	Partnership			
an individual doing bu	usiness as			
of		, County of	, and	t
State of			, Hereinafter called "Contr	actor".
WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:				

hereinafter called the project, for the sum of

dollars (\$______) and all extra work in connection therewith, under the terms as stated in the General & Special Conditions of the Contract; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the General Conditions, Supplemental General Conditions and Special Conditions of the contract, the plans, which include all maps, plats, blue prints, and other drawings and printed or written explanatory matter thereof, the specifications and contract documents therefor as prepared by

_______, herein entitled the Architect/Engineer, and as enumerated in Paragraph 1 of the Supplemental General Conditions, all of which are made a part hereof and collectively evidence and constitute the contract.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Paragraph 25, "Payments to Contractor," of the General Conditions.

IN WITNESS WHEREOF, the parties to these presents have executed this contract in six (6) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

(Seal)			
ATTEST:		(Owner)	
(Secretary)	Ву		
(Witness)		(Title)	
		(Contractor)	
(Seal)			
	Bv		
(Secretary)	,		
(Witness)		(Title)	

(Address and Zip Code)

NOTE: Secretary of the Owner should attest. If Contractor is a corporation, Secretary should attest.

CERTIFICATION REGARDING LOBBYING

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

- 1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- 3. The undersigned shall require that the language of this certifications be included in the contract documents for all subcontractors at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Date

Contractor

CERTIFICATION OF OWNER'S ATTORNEY

I, the undersigned,

the duly authorized and acting legal representative of

_ , do hereby certify as follows:

I have examined the attached contract(s) and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions and provisions thereof.

(Signature)

(Date)

Community Development Block Grant Program

GENERAL CONDITIONS

1. Contract and Contract Documents

The project to be constructed pursuant to this contract will be financed with assistance from the Department of Housing and Urban Development and is subject to all applicable Federal laws and regulations.

The Plans, Specifications and Addenda, hereinafter enumerated in Paragraph 1 of the Supplemental General Conditions shall form part of this Contract and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines, and marginal notes contained herein, and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect, limit or cast light on the interpretation of the provisions to which they refer.

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- 4. Shop or Setting Drawings
- 5. Materials, Services, and Facilities
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- 7. Inspection and Testing of Materials
- 8. "Or Equal" Clause
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- 10. Surveys, Permits and Regulations
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* Attachment to Federal Labor Standards Provisions

2. Definitions

The following terms as used in this contract are respectively defined as follows:

- a. "Contractor": A person, firm or corporation with whom the contract is made by the Owner.
- b. "Subcontractor": A person, firm or corporation supplying labor and materials or only labor for work at the site of the project for, and under separate contract or agreement with the contractor.
- c. "Work on (at) the project": Work to be performed at the location of the project, including the transportation of materials and supplies to or from the location of the project by employees of the Contractor and any Subcontractor.
- 3. Additional Instructions and Detail Drawings

The Contractor will be furnished additional instructions and detail drawings as necessary to carry out the work included in the contract. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as part thereof. The Contractor shall carry out the work in accordance with the additional detail drawings and instructions. The Contractor and the Architect/Engineer will prepare jointly (a) a schedule, fixing the dates at which special detail drawings will be required, such drawings, if any, to be furnished by the Architect/Engineer in accordance with said schedule, and (b) a schedule fixing the respective dates for the submission of shop drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment, and the completion of the various parts of the work: each such schedule to be subject to change from time to time in accordance with the progress of the work.

4. Shop or Setting Drawings

The Contractor shall submit promptly to the Architect/Engineer two copies of each shop or setting drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the Architect/Engineer and the return thereof, the Contractor shall make such corrections to the drawings as have been indicated and shall furnish the Architect/Engineer with two corrected copies. If requested by the Architect/Engineer the Contractor must furnish additional copies. Regardless of corrections made in or approval given to such drawings by the Architect/Engineer, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the Plans and Specifications, unless he notifies the Architect/Engineer in writing of any deviations at the time he furnishes such drawings.

- 5. Materials, Services, and Facilities
 - a. It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete, and deliver the work within the specified time.
 - b. Any work necessary to be performed after regular working hours, on Sundays or Legal Holidays, shall be performed without additional expense to the Owner.
- 6. Contractor's Title to Materials

No materials or supplies for the work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The contractor warrants that he has good title to all materials and supplies used by him in the work, free from all liens, claims or encumbrances.

- 7. Inspection and Testing of Materials
 - a. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with accepted standards. The laboratory or inspection agency shall be selected by the Owner. The owner will pay for all laboratory inspection service direct and not as a part of the contract.
 - b. Materials or construction, particularly those upon which the strength and durability of the structure may depend, shall be subject to inspection and testing to establish conformance with specifications and suitability for uses intended.
- 8. "Or Equal" Clause

Whenever a material, article or piece of equipment is identified on the plans or in the specifications by reference to manufacturers' or vendors' names, trade names, catalogue numbers, etc., it is intended merely to establish a standard; and, any material, article, or equipment of other manufacturers and vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or equipment so proposed, is, in the opinion of the Architect/Engineer, of equal substance and function. It shall not be purchased or installed by the Contractor without the Architect/Engineer's written approval.

- 9. Patents
 - a. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liability of any nature or kind, including cost and expenses for, or on account of, any patented or unpatented 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.
 - b. License or Royalty Fees: License and/or Royalty Fees for the use of a process which is authorized by the Owner of the project must be reasonable, and paid to the holder of the patent, or his authorized licensee, direct by the Owner and not by or through the Contractor.
 - c. If the Contractor uses any design, device or materials covered by letters, patent or copyright, 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, that, without exception, the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his Sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or this contract, and shall indemnify the Owner for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.
- 10. Surveys, Permits, and Regulations

Unless otherwise expressly provided for in the Specifications, the Owner will furnish to the Contractor all surveys necessary for the execution of the work.

The Contractor shall procure and pay all permits, licenses and approvals necessary for the execution of his contract.

The Contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to performance of the work, the protection of adjacent property, and the maintenance of passageways, guard fences or other protective facilities.

11. Contractor's Obligations

The Contractor shall and will in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings covered by this contract any and all supplemental plans and drawings, and in accordance with the directions of the Architect/Engineer as given from time to time during the progress of the work. He shall furnish, erect, maintain, and remove such construction plant and such temporary work as may be required.

The Contractor shall observe, comply with, and be subject to all terms, conditions, requirements, and limitations of the contract and specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Architect/Engineer and the Owner.

12. Weather Conditions

In the event of temporary suspension of work, or during inclement weather, or whenever the Architect/Engineer shall direct, the Contractor will, and will cause his subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Architect/Engineer, any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors so to protect his work, such materials shall be removed and replaced at the expense of the Contractor.

13. Protection of Work and Property – Emergency

The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract or by the Owner, or his duly authorized representatives.

In case of any emergency which threatens loss or injury of property, and/or safety of life, the Contractor will be allowed to act without previous instructions from the Architect/Engineer, in a diligent manner. He shall notify the Architect/Engineer immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Architect/Engineer for approval.

Where the Contractor has not taken action but has notified the Architect/Engineer of any emergency threatening injury to persons or damage to the work or any adjoining property, he shall act as instructed or authorized by the Architect/Engineer.

The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided in Paragraph 17 of the General Conditions.

14. Inspection

The authorized representatives and agents of the Department of Housing and Urban Development and/or the Department of Commerce shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

15. Reports, Records, and Data

The Contactor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data as the Owner may request concerning work performed or to be performed under this contract.

16. Superintendence by Contractor

At the site of the work the Contractor shall employ a construction superintendent or foreman who shall have full authority to act for the Contractor. It is understood that such representative shall be acceptable to the Architect/Engineer and shall be one who can be continued in that capacity for the particular job involved unless he ceases to be on the Contractor's payroll.

17. Changes in Work

No changes in the work covered by the approved Contract Documents shall be made without having prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of the following methods:

- a. Unit bid prices previously approved.
- b. An agreed lump sum.
- c. The actual cost of:
 - 1. Labor, including foremen;
 - 2. Materials entering permanently into the work;
 - 3. The ownership or rental cost of construction plant and equipment during the time of use on the extra work;
 - 4. Power and consumable supplies for the operation of power equipment;
 - 5. Insurance
 - 6. Social Security and old age and unemployment contributions. To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of supervision, overhead, bond, profit, and any other general expenses.

18. Extras

Without invalidating the contract, the Owner may order extra work or make changes by altering, adding to or deducting from the work, the contract sum being adjusted accordingly, and the consent of the Surety being first obtained where necessary or desirable. All the work of the kind bid upon shall be paid for at the price stipulated in the proposal, and no claims for any extra work or materials shall be allowed unless the work ordered in writing by the Owner or its Architect/Engineer, acting officially for the Owner, and the price is stated in such order.

19. Time for Completion and Liquidated Damages

It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed."

The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the Owner the amount specified in the contract, not as a penalty but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work. The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained from time to time by the Owner from current periodical estimates.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract.

<u>Provided</u>, that the Contractor shall not be charged with liquidated damages or any excess cost when the Owner determines that the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to the Owner. <u>Provided</u>, <u>further</u>, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

- a. To any preference, priority or allocation order duly issued by the Government;
- b. To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and severe weather; and
- c. To any delays of Subcontractors or suppliers occasioned by any of the causes specified in subsections (a) and (b) of this article:

<u>Provided, further</u>, that the Contractor shall, within ten (10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Contractor within a reasonable time of its decision in the matter.

20. Correction of Work

All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be at all times and places subject to the inspection of the Architect/Engineer who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture, and methods of construction for the purposes for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the Architect/Engineer, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the Contract Documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgment of the Architect/Engineer shall be equitable.

21. Subsurface Conditions Found Different

Should the Contractor encounter sub-surface and/or latent conditions at the site materially differing from those shown on the Plans or indicated in the Specifications, he shall immediately give notice to the Architect/Engineer of such conditions before they are disturbed. The Architect/Engineer will thereupon promptly investigate the conditions, and if he finds that they materially differ from those shown on the Plans, or indicated in the Specifications, he will at once make such changes in the Plans and/or Specifications as he may find necessary, any increase or decrease of cost resulting from such changes to be adjusted in the manner provided in Paragraph 17 of the General Conditions.

22. Claims for Extra Cost

No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the Architect/Engineer approved by the Owner, as aforesaid, and the claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms of subparagraph 17(c) of the General Conditions, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items or cost and when requested by the Owner, give the Owner access to accounts relating thereto.

23. Right of Owner to Terminate Contract

In the event that any of the provisions of this contract are violated by the Contractor or by any of his subcontractors, the Owner may serve written notice upon the Contractor and the Surety of its intention to terminate the contract, such notices to contain the reasons for such intention to terminate the contract, and unless within ten (10) days after the serving of such notice upon the Contractor, such violation or delay shall cease and satisfactory arrangement of correction be made, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor and the Surety shall have the right to take over and perform the contract; <u>Provided</u>, however, that if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such Surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or by force account for the account and at the expense of the Contractor and the Contractor and his Surety shall be liable to the Owner for any excess cost occasioned the Owner thereby, and in such event the Owner may take possession of and utilize in completing the work, such materials, appliances, and plant as may be on the site of the work and necessary therefor.

24. Construction Schedule and Periodic Estimates

Immediately after execution and delivery of the contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule. The Contractor shall also furnish on forms to be supplied by the owner (a) a detailed estimate giving a complete breakdown of the contract price and (b) periodic itemized estimates of work done for the purpose of making partial payments thereon. The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

25. Payments to Contractor

- a. Not later than the 15th day of each calendar month the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this contract, but to insure the proper performance of this contract, the Owner shall retain ten percent (10%) of the amount of each estimate until final completion and acceptance of all work covered by this contract: <u>Provided</u>, that the Contractor shall submit his estimate not later than the first day of the month: <u>Provided</u>, further, that the Owner at any time after fifty percent (50%) of the work has been completed, if it finds that satisfactory progress is being made, may make any of the remaining progress payments in full: <u>Provided further</u>, that on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made in full, including retained percentages thereon, less authorized deductions.
- b. In preparing estimates the material delivered on the site and preparatory work done may be taken into consideration.

- c. All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the contract.
- d. Owner's Right to Withhold Certain Amounts and Make Application Thereof: The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, material, men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the said Contractor, either pay unpaid bills, of which the Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the contractor shall be resumed, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor or his Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the contract by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

26. Acceptance of Final Constitutes Release

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and liability to the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of his work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this contractor or the Performance and Payment Bond.

27. Payments by Contractor

The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered, (b) for all materials, tools and other expendable equipment to the extent of ninety percent (90%) of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the project, and the balance of the cost thereof, not later than the 30th day following the completion of that part of the work in or on which such materials, tolls, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of each subcontractor's interest therein.

28 Insurance

The Contractor shall not commence work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until the insurance required of the subcontractor has been so obtained and approved.

a. <u>Compensation Insurance</u>: The Contractor shall procure and shall maintain during the life of this contract Workmen's Compensation Insurance as required by applicable State or territorial law for all of his employees to be engaged in work at the site of the project under this contract and, in case of any such work sublet, the Contractor shall require the subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such work

unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In case any class of employees engaged in hazardous work on the project under this contract is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each subcontractor to provide adequate employees as are not otherwise protected.

- b. <u>Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance</u>: The Contractor shall procure and maintain during the life of this contract Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the amounts specified in the Supplemental General Conditions.
- c. <u>Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance</u>: The Contractor shall either (1) require each of his subcontractors to procure and to maintain during the life of this subcontract, Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and of the amounts specified in the Supplemental General Conditions specified in subparagraph (b) hereof or, (2) insure the activities of his policy, specified in subparagraph (b) hereof.
- d. <u>Scope of Insurance and Special Hazards</u>: The insurance required under subparagraphs (b) and (c) hereof shall provide adequate protection for the Contractor and his subcontractors, respectively, against damage claims which may arise from operations under this contract, whether such operations by the insured or by anyone directly or indirectly employed by him and, also against any of the special hazards which may be encountered in the performance of this contract as enumerated in the Supplemental General Conditions.
- e. <u>Builder's Risk Insurance (Fire and Extended Coverage)</u>: Until the project is completed and accepted by the Owner, the Owner, of Contractor (at the Owner's option as indicated in the Supplemental General Conditions, Form HUD-4238-N) is required to maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portion of the project for the benefit of the Owner, the Contractor, or subcontractors as their interests may appear. The Contractor shall not include any costs for Builder's Risk Insurance (fire and extended coverage) premiums during construction unless the Contractor is required to provide such insurance; however, this provision shall not release the Contractor from his obligation to complete, according to plans and specifications, the project covered by the contract, and the Contractor and his Surety shall be obligated to full performance of Contractor's undertaking.
- f. <u>Proof of Carriage of Insurance</u>: The Contractor shall furnish the Owner with certificates showing the type, amount, class of operation covered, effective dates and date of expiration of policies. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be cancelled or materially altered, except after ten (10) days written notice has been received by the Owner."

29. Contract Security

The Contractor shall furnish a performance bond in an amount of at least equal to one hundred percent (100%) of the contract prices as security for the faithful performance of this contract and also a payment bond in an amount not less than one hundred percent (100%) of the contract price or in a penal sum not less than that prescribed by State, territorial or local law, for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract. The performance bond and the payment bond may be in one or in separate instruments in accordance with local law.

30. Additional or Substitute Bond

If at any time the Owner for justifiable cause shall be or become dissatisfied with any surety or sureties, then upon the Performance or Payment Bonds, the Contractor shall within five (5) days after notice from the Owner so to do, substitute an acceptable bond (or bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the Owner.

31. Assignments

The Contractor shall not assign the whole or any part of this contract or any moneys due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any moneys due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior claims of all persons, firms and corporations of services rendered or materials supplied for the performance of the work called for in this contract.

32. Mutual Responsibility of Contractors

If, through acts of neglect on the part of the Contractor, any other Contractor or any subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other Contractor or subcontractor by agreement or arbitration if such other Contractor or subcontractors will so settle. If such other Contractor or subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

33. Separate Contract

The Contractor shall coordinate his operations with those of other Contractors. Cooperation will be required in the arrangement for the storage of materials and in the detailed execution of the work. The Contractor, including his subcontractors, shall keep informed of the progress and the detail work of other Contractors and shall notify the Architect/Engineer immediately of lack of progress or defective workmanship on the part of other Contractors. Failure of a Contractor to keep informed of the work progressing on the site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by him of the status of the work as being satisfactory for proper coordination with his own work.

34. Subcontracting

- a. The Contractor may utilize the services of specialty subcontractors on those parts of the work which, under normal contracting practices, are performed by specialty subcontractors.
- b. The Contractor shall not award any work to any subcontractors without prior written approval of the Owner, which approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the subcontractor, which statement shall contain such information as the Owner may require.
- c. The Contractor shall be as fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- d. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and other contract documents insofar as applicable to the work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the contract documents.

- e. Nothing contained in this contract shall create any contractual relation between any subcontractor and the Owner.
- 35. Architect/Engineer's Authority

The Architect/Engineer shall give all orders and directions contemplated under this contract and specifications, relative to the execution of the work. The Architect/Engineer shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Architect/Engineer's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determinations or decision of the Architect/Engineer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

The Architect/Engineer shall decide the meaning and intent of any portion or of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the Contractor under this contract and other Contractors performing work for the Owner shall be adjusted and determined by the Architect/Engineer.

36. Stated Allowances

The Contractor shall include in his proposal the cash allowances stated in the Supplemental General Conditions. The Contractor shall purchase the "Allowed Materials" as directed by the Owner on the basis of the lowest and best bid of at least three competitive bids. If the actual price for purchasing the "Allowed Materials" is more or less than the "Cash Allowance," the contract price shall be adjusted accordingly. The adjustment in contract price shall be made on the basis of the purchase price without additional charges for overhead, profit, insurance or any other incidental expenses. The cost of installation of the "Allowed Materials" shall be included in the applicable sections of the Contract Specifications covering this work.

37. Use of Premises and Removal of Debris

The Contractor expressly undertakes at his own expense:

- a. To take every precaution against injuries to persons or damage to property;
- b. To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other contractors';
- c. To place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work;
- d. To clean up frequently all refuse, rubbish, scrap material, and debris caused by his operations, to the end that all times the site of the work shall present a neat, orderly and workmanlike appearance;
- e. Before final payment to remove all surplus material, false-work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in a neat, orderly condition;
- f. To effect all cutting, fitting or patching of his work required to make the same to conform to the plans and specifications and, except with the consent of the Architect/Engineer, not to cut or otherwise alter the work of any other Contractor.

38. Quantities of Estimate

Wherever the estimated quantities of work to be done and materials to be furnished under this contract are shown in any of the documents including the proposal, they are given for use in comparing bids and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this contract, and such increase or diminution shall in no way violate this contract, nor shall any such increase or diminution give cause for claims or liability for damages.

39. Lands and Rights-of-Way

Prior to the start of construction, the Owner shall obtain all lands and rights-of-way necessary for the carrying out the completion of work to be performed under this contract.

40. General Guaranty

Neither the final certificate of payment nor any provision in the Contract Documents, nor partial or entire occupancy of the premises by the Owner, shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness.

41. Conflicting Conditions

Any provisions in any of the Contract Documents which may be in conflict or inconsistent with any of the paragraphs in these General Conditions shall be void to the extent of such conflict or inconsistency.

42. Notice and Service Thereof

Any notice to any Contractor from the Owner relative to any part of this contract shall be in writing and considered delivered and the service thereof completed, when said notice is posted, by certified or registered mail, to the said Contractor at his last given address, delivered in person to the said Contractor or his authorized representative of the work.

43. Provisions Required by Law 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 application of either party the contract shall forthwith by physically amended to make such insertion or corrections.

44. Protection of Lives and Health

"The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes, in addition to specific safety and health regulations described by Chapter XIII, Bureau of Labor Standards, Department of Labor, Part 1518, Safety and Health Regulations for Construction, as outlined in the Federal Register, Volume 36, No. 75, Saturday, April 17, 1971. Title 29 – LABOR, shall be observed and the Contractor shall take or cause to be taken, such additional safety and health measures as the Contracting Authority may determine to be reasonably necessary."

45. Subcontracts

"The Contractor will insert in any subcontracts the Federal Labor Standards Provisions contained herein and such other clauses as the Department of Housing and Urban Development may, by instructions required, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made."

46. Interest of Member of or Delegate to Congress

No member of 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.

47. Other Prohibited Interests

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 in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part hereof. No officer, employee, architect, attorney, engineer, or inspector of or for the owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

48. Use and Occupancy Prior to Acceptance by Owner

The Contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the Owner, provided the Owner:

- a. Secures written consent of the Contractor except in the event, in the opinion of the Architect/Engineer, the Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other contract requirements.
- b. Secures endorsement from the insurance carrier and consent of the surety permitting occupancy of the building or use of the project during the remaining period of construction, or,
- c. When the project consists of more than one building, and one of the buildings is occupied, secures permanent fire and extended coverage insurance, including a permit to complete construction. Consent of the surety must also be obtained.
 - 1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicant for employment, notices to be provided setting forth the provisions of this non-discrimination clause.
 - 2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

49. Photographs of the Project

If required by the Owner, the Contractor shall furnish photographs of the project, in the quantities and as described in the Supplemental General Conditions.

50. Suspension of Work

Should the Owner be prevented or enjoined from proceeding with work either before or after the start of construction by reason or any litigation or other reason beyond the control of the Owner, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay; but time for completion of the work will be extended to such reasonable time as the Owner may determine will compensate for time lost by such delay with such determination to be set forth in writing.

51. Minimum Wages

All laborers and mechanics employed upon the work covered by this Contract shall be paid unconditionally and not less often than once each week, and without subsequent deduction or rebate on any account (except such payroll deductions as are made mandatory by law and such other payroll deductions as are permitted by the applicable regulations issued by the Secretary of Labor, United States Department of Labor, pursuant to the Anti-Kickback Act hereinafter identified), the full amount due at time of payment computed at wage rates not less than those contained in the wage determination decision of said Secretary of Labor (a copy of which is attached and herein incorporated by reference), regardless of any contractual relationship which may be alleged to exist between the Contractor or any subcontractor and such laborers and mechanics. All laborers and mechanics employed upon such work shall be paid in cash, except that payment may be by check if the employer provides or secures satisfactory facilities approved by the Local Public Agency or Public Body for the cashing of the same without cost or expense to the employee. For the purpose of this clause, contributions made or costs reasonably anticipated under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section 5.5 (a)(1)(IV) of Title 29, Code of Federal Regulations. Also for the purpose of this clause, regular contributions made or cost incurred for more than a weekly period under plans, funds, or programs, but covering the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

52. Underpayment of Wages or Salaries

In case of underpayment of wages by the Contractor or by any subcontractors to laborers or mechanics employed by the Contractor or subcontractor upon the work covered by this Contract, the Local Public Agency or Public Body in addition to such other rights as may be afforded it under this Contract shall withhold from the Contractor, out of any payments due the Contractor, so much thereof as the Local Public Agency or Public Body may consider necessary to pay such laborers or mechanics the full amount of wages required by this Contract. The amount so withheld may be disbursed by the Local Public Agency or Public Body, for and on account of the Contractor or the subcontractor (as may be appropriate), to the respective laborers or mechanics to whom the same is due or on their behalf to plans, funds, or programs for any type of fringe benefit prescribed in the applicable wage determination.

53. Anticipated Costs of Fringe Benefits

If the Contractor does not make payments to a trustee or other third person, he may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing fringe benefits under a plan or program of a type expressly listed in the wage determination decision of the Secretary of Labor which is a part of this Contract: provided, however, the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. A copy of any findings made by the Secretary of Labor in respect to fringe benefits being provided by the Contractor must be submitted to the Local Public Agency or Public Body with the first payroll filed by the Contractor subsequent to receipt of the findings.

- 54. Overtime Compensation Required by Contract Work Hours and Safety Standards Act (76 Stat. 357-360: Title 40 U.S.C., Sections 327-332)
 - a. <u>Overtime Requirements</u>. No Contractor or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics, including watchmen and guards, shall require or permit any laborer or mechanic in any workweek in which he is employed on such work to work in excess of 40 hours in such work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half time his basic rate of pay for all hours worked in excess of 40 hours in such work week, as the case may be.
 - b. <u>Violation: Liability for Unpaid Wages Liquidated Damages</u>. In the event of any violation of the clause set forth in Paragraph (a), the Contractor and any subcontractor responsible therefore shall be liable to any affected employee for his unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violations of the clause set forth in Paragraph (a), in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in Paragraph (a).
 - c. <u>Withholding for Liquidated Damages</u>. The Local Public Agency or Public Body shall withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor, such sums as may administratively be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for liquidated damages as provided in the clause set forth in Paragraph (b).
 - d. <u>Subcontracts</u>. The Contractor shall insert any subcontracts the clauses set forth in Paragraph (a), (b), and (c) of this Section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.
- 55. Employment of Apprentices/Trainees
 - Apprentices will be permitted to work at less than the predetermined rate for the work they a. performed when they are employed and individually registered in a bona-fide apprenticeship program registered with the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeyman in any craft classification shall not be greater than the ratio permitted to the contractors to his entire work force under the registered program. Any employee listed on a payroll at any apprentice wage rate, who is not a trainee as defined in subdivision (b) of this subparagraph or is not registered or otherwise employed as stated above, shall be paid the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or subcontractor will be required to furnish to the contracting officer or a representative of the Wage-Hour Division of the U.S. Department of Labor written evidence of the registration of his program and apprentices as well as the appropriate ratios and wage rates (expressed in percentages of the journeyman hourly rates), for the area of construction prior to using any apprentices on the contract work. The wage rate paid apprentices shall be not less than the appropriate percentage of the journeyman's rate contained in the applicable wage determination.
 - b. Trainees. Except as provided in 29 CFR 5.15 trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification, by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training. Every trainee must be paid at not less than the rate specified in the

approved program for his level of progress. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Bureau of Apprenticeship and Training shall be paid not less than the wage rate determined by the Secretary of Labor for the classification of work he actually performed. The Contractor or subcontractor will be required to furnish the contracting officer or a representative of the Wage-Hour Division of the U.S. Department of Labor written evidence of the certification of his program, the registration of the trainees, and the ratios and wage rates prescribed in that program. In the event the Bureau of Apprenticeship and Training withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- c. Equal Employment Opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 112246, as amended, as 29 CFR Part 30.
- 56. Employment of Certain Persons Prohibited

No person under the age of sixteen years and no person who, at the time, is serving sentence in a penal or correctional institution shall be employed on the work covered by this Contract.

57. Regulations Pursuant to So-Called "Anti-Kickback Act"

The Contractor shall comply with the applicable regulations (a copy of which is attached and herein incorporated by reference) of the Secretary of Labor, United States Department of Labor, made pursuant to the So-Called "Anti-Kickback Act" of June 13, 1934 (48 Stat. 948: 62 Stat. 862; Title U.S.C., Section 874: and Title 40 U.S.C. Section 276c), and any amendments or modifications thereof, shall cause appropriate provisions to be inserted in subcontracts to insure compliance therewith by all subcontractors subject thereto, and shall be responsible for the submission of affidavits required by subcontractors there under, except as said Secretary of Labor may specifically provide for reasonable limitations, variations, tolerances, and exemptions from the requirements thereof.

58. Employment of Laborers or Mechanics Not Listed in Aforesaid Wage Determination Decision

Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the Contract will be classified or reclassified conformably to the wage determination by the Local Public Agency or Public Body, and a report of the action taken shall be submitted by the Local Public Agency or Public Body, through the Secretary of Housing and Urban Development, to the Secretary of Labor, United States Department of Labor. In the event the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers and mechanics to be used, the question accompanied by the recommendation of the Local Public Agency of Public Body shall be referred, through the Secretary of Housing and Urban Development, to the Secretary of Labor for final determination.

59. Fringe Benefits Not Expressed as Hourly Wage Rates

The Local Public Agency or Public Body shall require, whenever the minimum wage rate prescribed in the Contract for class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly wage rate and the Contractor is obligated to pay cash equivalent of such a fringe benefit, an hourly cash equivalent thereof to be established. In the event the interested parties cannot agree upon a cash equivalent of the fringe benefit, the question, accompanied by the recommendation of the Local Public Agency or Public Body, shall be referred, through the Secretary of Housing and Urban Development, to the Secretary of Labor for determination.

60. Posting Wage Determination Decisions and Authorized Wage Deductions

The applicable wage poster of the Secretary of Labor, United States Department of Labor, and the applicable wage determination decisions of said Secretary of Labor with respect to the various classification of laborers and mechanics employed and to be employed on the work covered by this

Contract, and a statement showing all deductions, if any, in accordance with the provisions of this Contract, to be made from wages actually earned by persons so employed or to be employed in such classifications, shall be posted at appropriate conspicuous points at the site of the work.

61. Complaints, Proceedings, or Testimony by Employees

No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

62. Claims and Disputes Pertaining to Wage Rates

Claims and disputes pertaining to wage rates or to classifications of laborers and mechanics employed upon the work covered by this Contract shall be promptly reported by the Contractor in writing to the Local Public Agency or Public Body for referral by the latter through the Secretary of Housing and Urban Development to the Secretary of Labor, United States Department of Labor, whose decision shall be final with respect thereto.

63. Questions Concerning Certain Federal Statues and Regulations

All questions arising under this Contract which relate to the application or interpretation of (a) the aforesaid Anti-Kickback Act, (b) the Contract Work Hours and Safety Standards Act, (c) the aforesaid Davis-Bacon Act, (d) the regulations issued by the Secretary of Labor, United States Department of Labor, pursuant to said Acts, or (e) the labor standards provisions of any other pertinent Federal statute, shall be referred, through the Local Public Agency or Public Body and the Secretary of Housing and Urban Development, to the Secretary of Labor, United States Department of Labor, for said Secretary's appropriate ruling or interpretation which shall be authoritative and may be relied upon for the purposes of this Contract.

64. Payrolls and Basic Records of Contractor and Subcontractors

The Contractor and each subcontractor shall prepare his payrolls on forms satisfactory to and in accordance with instructions to be furnished by the Local Public Agency or Public Body. The Contractor shall submit weekly to the Local Public Agency or Public Body two certified copies of all payrolls of the Contractor and of the subcontractors, it being understood that the Contractor shall be responsible for the submission of copies of payrolls of all subcontractors. Each such payroll shall contain the "Weekly Statement of Compliance" set forth in section 3.3 of Title 29, Code of Federal Regulations. The payrolls and basic payroll records of the Contractor and each subcontractor covering all laborers and mechanics employed upon the work covered by this Contract shall be maintained during the course of the work and preserved for a period of 5 years thereafter. Such payrolls and basic payroll records shall contain the name and address of each such employee, his correct classification, rate of pay (including rates of contributions or costs anticipated of the types described by Section 1(b) (2) of the David-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. In addition, whenever the Secretary of Labor has found under Section 5.5 (a) (1) (iv) of Title 29, Code of Federal Regulations, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b) (2) (3) of the Davis-Bacon Act, the Contractor or subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. The Contractor and each subcontractor shall make his employment records with respect to persons employed by him upon the work covered by this Contract available for inspection by authorized representatives of the Secretary of Housing and Urban Development, the Local Public Agency or Public Body, and the United States Department of Labor.

Such representatives shall be permitted to interview employees of the Contractor or of any subcontractor during working hours on the job.

65. Specific Coverage of Certain Types of Work by Employees

The transporting of materials and supplies to or from the site of the Project or Program to which this Contract pertains by the employees of the Contractor or of any subcontractor, and the manufacturing or furnishing or materials, articles, supplies, or equipment on the site of the Project or Program to which this Contract pertains by persons employed by the Contractor or by any subcontractor, shall, for the purposes of this Contract, and without limiting the generality of the foregoing provisions of this Contract, be deemed to be work to which these Federal Labor Standard Provisions are applicable.

66. Ineligible Subcontractors

The Contractor shall not subcontract any part of the work covered by this Contract or permit subcontracted work to be further subcontracted without the Local Public Agency's or Public Body's prior written approval of the subcontractor. The Local Public Agency or Public Body will not approve any subcontractor for work covered by this Contract who is at the time ineligible under the provisions of any applicable regulations issued by the Secretary of Labor, United States Department of Labor or the Secretary of Housing and Urban Development, to receive an award of such subcontract.

67. Provisions to be Included in Certain Subcontracts

The Contractor shall include or cause to be included in each subcontract covering any of the work covered by this Contract, provisions which are consistent with these Federal Labor Standards Provisions and also a clause requiring the subcontractors to include such provisions in any lower tier subcontracts which they may enter into, together with a clause requiring such insertion in any further subcontracts that may in turn be made.

68. Breach of Foregoing Federal Labor Standards Provision

In addition to the causes for termination of this Contract as herein elsewhere set forth, the Local Public Agency or Public Body reserves the right to terminate this Contract if the Contractor or any subcontractor whose subcontract covers any of the work covered by this Contract shall breach any of these Federal Labor Standards Provisions. A breach of these Federal Labor Standards Provisions may also be grounds for debarment as provided by the applicable regulations issued by the Secretary of Labor, United States Department of Labor.

69. Employment Practices

The Contractor (1) shall, to the greatest extent practicable, follow hiring and employment practices for work on the project which will provide new job opportunities for the unemployed and underemployed; and (2) shall insert or cause to be inserted the same provision in each construction subcontract.

70. Contract Termination; Debarment

A breach of Section 45 and the Federal Labor Standards Provision, may be grounds for termination of the contract, and for debarment as provided in 29 CFR 5.6.

FEDERAL LABOR STANDARDS PROVISIONS

U.S. Department of Housing and Urban Development

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible,

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

form HUD-4010 (06/2009) Ref. Handbook 1344.1 (c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

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(Previous Edition is Obsolete)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(i), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(Previous Edition is Obsolete)

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant ', to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

form HUD-4010 (06/2009) Ref. Handbook 1344.1 **5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this Paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24. awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this Paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

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(Previous Edition is Obsolete)

(1) **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this Paragraph C are applicable only where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The Contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

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(Previous Edition is Obsolete)

ATTACHMENT TO FEDERAL LABOR STANDARDS PROVISIONS

SO-CALLED "ANTI-KICKBACK ACT" AND REGULATIONS PROMULGATED

PURSUANT THERETO BY THE SECRETARY OF LABOR, UNITED STATES DEPARTMENT OF LABOR

TITLE 18, U.S.C., SECTION 374

(Replaces Section 1 of the Act of June 13, 1934 (48 Stat. 948, 40 U.S.C., Sec. 276b) pursuant to the Act of June 25, 1948, 62 Stat. 862)

Kickbacks from Public Works Employees

Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined not more than \$5,000 or imprisoned not more than five years, or both

SECTION 2 OF THE ACT OF JUNE 13, 1934, AS AMENDED (48 Stat. 948, 62 Stat. 262, 63 Stat. 108, 72 Stat. 967, 40 U.S.C., Sec. 276c)

The Secretary of Labor shall make reasonable regulations for contractors and subcontractors engaged in the construction, prosecution, completion or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States, including a provision that each contractor and subcontractor shall furnish weekly a statement with respect to the wages paid each employee during the preceding week. Section 1001 of Title 18 (United States Code) shall apply to such statements.

Pursuant to the aforesaid Anti-Kickback Act, the Secretary of Labor, United States Department of Labor, has promulgated the regulations hereinafter set forth, which regulations are found in Title 29, Subtitle A, Code of Federal Regulations, Part 3. The term "this part" as used in the regulations hereinafter set forth, refers to Part 3 last above mentioned. Said regulations are as follows.

TITLE 29 – LABOR

Subtitle A – Office of the Secretary of Labor

Part 3 CONTRACTORS AND SUBCONTRACTORS ON PUBLIC BUILDING OR PUBLIC WORK FINANCED IN WHOLE OR IN PART BY LOANS OR GRANTS FROM THE UNITED STATES.

SECTION 3.1 PURPOSE AND SCOPE

This part prescribes "anti-kickback" regulations under Section 2 of the Act of June 13, 1934, as amended (40 U.S.C. 276c), popularly known as the Copeland Act. This part applies to any contract which is subject to Federal Wage standards and which is for the construction, prosecution, completion, or repair of public buildings, public works or buildings or works financed in whole or in part by loans or grants from the United States. The part is intended to aid in the enforcement of the minimum wage provisions of the Davis-Bacon Act and the various statutes dealing with Federally assisted construction that contain similar minimum wage provisions, including those provisions which are not subject to Reorganization Plan No. 14 (e.g., the College Housing Act of 1950, the Federal Water Pollution Control Act, and the Housing Act of 1959), and in the enforcement of the overtime provisions of the Contract Work Hours Standards Act whenever they are applicable to construction work. The part details the obligation of Contractors and subcontractors relative to the weekly submission of statements regarding the wages paid on work covered thereby; sets forth the circumstances and procedures governing the making of payroll deductions from the wages of those employed on such work; and delineates the methods of payment permissible on such work.

SECTION 3.2 DEFINITIONS

As used in the regulation in this part:

- a. The terms "building" or "work" generally include construction activity as distinguished from manufacturing, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, and canals; dredging, shoring, scaffolding, drilling, blasting, excavating, cleaning, and landscaping. Unless conducted in connection with and at the site of such a building or work as is described in the foregoing sentence, the manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not a "building" or "work" within the meaning of the regulations in this part.
- b. The terms "construction," "prosecution," "completion," or "repair" mean all types of work done on a particular building or work at the site thereof, including, without limitation, altering, remodeling, painting and decorating, the transporting of materials and supplies to or from the building or work by the employees of the construction Contractor or construction subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work, by persons employed at the site by the Contractor or subcontractor.
- c. The terms "public building" or "public work" include building or work for whose construction, prosecution, completion, or repair, as defined above, a Federal agency is a contracting party, regardless of whether title thereof is in a Federal agency.
- d. The term "building or work financed in whole or in part by loans or grants from the United States" includes building or work for whose construction, prosecution, completion, or repair, as defined above, payment or part payment is made directly or indirectly from funds provided by loans or grants by a Federal agency. The term does not include building or work for which Federal assistance is limited solely to loan guarantees or insurance.
- e. Every person paid by a Contractor or subcontractor in any manner for his labor in the construction, prosecution, completion, or repair of a public building or public work or building or work financed in whole or in part by loans or grants from the United States is "employed" and receiving "wages" regardless of any contractual relationship alleged to exist between him and the real employer.

- f. The term "any affiliated person" includes a spouse, child, parent, or other close relative or the Contractor or subcontractor; a partner or officer of the Contractor or subcontractor; a corporation closely connected with the Contractor or subcontractor as parent, subsidiary or otherwise, and an officer, or agent of such corporation.
- g. The term "federal agency" means the United States, the District of Columbia, and all executive departments, independent establishments, administrative agencies, and instrumentalities of the United States and the District of Columbia, including corporations, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or any of the foregoing departments, establishments, agencies, and instrumentalities.

SECTION 3.3 WEEKLY STATEMENT WITH RESPECT TO PAYMENT OF WAGES

- a. As used in this section the term "employee" shall not apply to persons in classifications higher than that of laborer or mechanic and those who are the immediate supervisors or such employees.
- b. Each Contractor or subcontractor engaged in the construction, prosecution, completion, or repair of any public building or public work, or building or work financed in whole or in part by loans or grants from the United States, shall furnish each week a statement with respect to the wages paid each of its employees engaged on work covered by 29 CFR Parts 3 and 5 during the preceding weekly payroll period. This statement shall be executed by the Contractor or subcontractor or by an authorized officer or employee of the Contractor or subcontractor who supervises the payment of wages, and shall be on form WH 3-18, "Statement of Compliance", or on an identical form on the back of WH 3-17 "Payroll (For Contractors Optional Use)", or on any form with identical wording. Sample copies of WH 3-17 and WH 3-18 may be obtained from the Government contracting or sponsoring agency, and copies of these forms may be purchased by the Government Printing Office.
- c. The requirements of this section shall not apply to any contract of \$2,000.00 or less.
- d. Upon a written finding by the head of a Federal agency, the Secretary of Labor may provide reasonable limitations, variations, tolerances, and exemptions from the requirements of the section subject to such conditions as the Secretary of Labor may specify.

(29 F.R. 95. Jan. 4, 1964, as amended at 33 F.R. 10186, July 17, 1968)

SECTION 3.4 SUBMISSION OF WEEKLY STATEMENTS AND THE PRESERVATION AND INSPECTION OF WEEKLY PAYROLL RECORDS

- a. Each weekly statement required under 3.3 shall be delivered by the Contractor or subcontractor, within seven days after the regular payment date of the payroll period; to a representative of a Federal or State agency in charge at the site of the building or work, or if there is no representative of a Federal or State agency at the site of the building or work, the statement shall be mailed by the Contractor or subcontractor, within such time, to a Federal or State agency contracting for or financing the building or work. After such examination and check as may be made, such statement, or a copy thereof, shall be kept available, or shall be transmitted together with a report of any violation, in accordance with applicable procedures prescribed by the United States Department of Labor.
- b. Each Contractor or subcontractor shall preserve his weekly payroll records for a period of five years from date of completion of the contract. The payroll records shall set out accurately and completely the name and address of each laborer and mechanic, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Such payroll records shall be made available at all times for inspection by the contracting officer or his authorized representative, and by authorized representatives of the Department of Labor.

SECTION 3.5 PAYROLL DEDUCTIONS PERMISSIBLE WITHOUT APPLICATION TO OR APPROVAL OF THE SECRETARY OF LABOR

Deductions made under the circumstances or in the situations described in the paragraphs of this section may be made without application to and approval of the Secretary of Labor.

- a. Any deductions made in compliance with the requirements of Federal, State, or local law, such as Federal or State withholding income taxes and Federal social security taxes.
- b. Any deductions of sums previously paid to the employee as a bona fide prepayment of wages when such prepayment is made without discount or interest. A "bona fide prepayment of wages" is considered to have been made only when cash or its equivalent has been advanced to the person employed in such manner as to give him complete freedom of disposition of the advanced funds.
- c. Any deduction of amounts required by court process to be paid to another, unless the deduction is in favor of the Contractor, subcontractor or any affiliated person, or when collusion or collaboration exists.
- d. Any deduction constituting a contribution on behalf of the person employed to funds established by the employer or representatives of employees, or both, for the purpose for providing either from principal or income, or both, medical or hospital care, pensions or annuities on retirement, death benefits, compensation for injuries, illness, accidents, sickness, or disability, or for insurance to provide any of the foregoing, or unemployment benefits, vacation pay, savings accounts, or similar payments for the benefit of employees, their families and dependents: Provided, however, that the following standards are met: (1) the deduction not otherwise prohibited by law; (2) it is either: (i) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of or for the continuation of employment, or (ii) provided for in a bona fide collective bargaining agreement between the Contractor or subcontractor and representatives of its employees; (3) no profit or other benefit is otherwise obtained, directly or indirectly, by the Contractor or subcontractor or any affiliated person in the form of commission, dividend, or otherwise; and (4) the deductions shall serve the convenience and interest of the employee.
- e. Any deduction contributing toward the purchase of Untied States Defense Stamps and Bonds when voluntarily authorized by the employee.
- f. Any deduction requested by the employer to enable him to repay loans to or to purchase shares in credit unions organized and operated in accordance with Federal and State credit union statues.
- g. Any deduction voluntarily authorized by the employee for the making of contributions to governmental or quasi-governmental agencies, such as the American Red Cross.
- h. Any deduction voluntarily authorized by the employee for the making of contributions to Community Chests, United Givers Funds, and similar charitable organizations.
- i. Any deductions to pay regular union initiation fees and membership dues, not including fines or special assessments: Provided, however, that a collective bargaining agreement between the Contractor or subcontractor and representative of its employees provides for such deductions and the deductions are not otherwise prohibited by law.
- j. Any deduction not more than for the "reasonable cost" of board, lodging, or other facilities meeting the requirements of section 3 (m) of the Fair Labor Standards Act of 1938, as amended, and Part 531 of this title. When such a deduction is made the additional records required under 516.27 91) of this title shall be kept.

SECTION 3.6 PAYROLL DEDUCTIONS PERMISSIBLE WITH THE APPROVAL OF THE SECRETARY OF LABOR

Any Contractor or subcontractor may apply to the Secretary of Labor for permission to make any deduction not permitted under 3.5. The Secretary may grant permission whenever he finds that:

- a. The Contractor, subcontractor, or any affiliated person does not make a profit or benefit directly or indirectly from the deduction either in the form of a commission, dividend, or otherwise;
- b. The deduction is not otherwise prohibited by law;
- c. The deduction is either (1) voluntarily consented to by the employee in writing and in advance of the period in which the work is to be done and such consent is not a condition either for the obtaining of employment or its continuance, or (2) provided for in a bona fide collective bargaining agreement between the Contractor or subcontractor and representatives of its employees; and
- d. The deduction serves the convenience and interest of the employee.

SECTION 3.7 APPLICATIONS FOR THE APPROVAL OF THE SECRETARY OF LABOR

Any application for the making of payroll deductions under 3.6 shall comply with the requirements prescribed in the following paragraphs of this section:

- a. The application shall be in writing and shall be addressed to the Secretary of Labor.
- b. The application shall identify the contract or contracts under which the work in question is to be performed. Permission will be given for deductions only on specific, identified contract, except upon a showing of exceptional circumstances.
- c. The application shall state affirmatively that there is compliance with the standards set forth in the provisions of 3.6. The affirmation shall be accompanied by a full statement of the facts indicating such compliance.
- d. The application shall include a description of the proposed deduction, the purpose to be served thereby, and the classes of laborers or mechanics from whose wages the proposed deduction would be made.
- e. The application shall state the name and business of any third person to whom any funds obtained from the proposed deductions are to be transmitted and the affiliation of such person, if any, with the applicant.

SECTION 3.8 ACTION BY THE SECRETARY OF LABOR UPON APPLICATIONS

The Secretary of Labor shall decide whether or not the requested deduction is permissible under provisions or 3.6, and shall notify the applicant in writing of his decision.

SECTION 3.9 PROHIBITED PAYROLL DEDUCTIONS

Deductions not elsewhere provided for by this part and which are not found to be permissible under 3.6 are prohibited.

SECTION 3.10 METHODS OF PAYMENT OF WAGES

The payment of wages shall be by cash, negotiable instruments payable on demand, or the additional forms of compensation for which deductions are permissible under this part. No other methods of payment shall be recognized on work subject to the Copeland Act.

SECTION 3.11 REGULATIONS PART OF CONTRACT

All contracts made with respect to the construction, prosecution, completion, or repair or any public building or public work or building or work finances in whole or in part by loans or grants from the United States covered by the regulations in this part shall expressly bind the Contractor or subcontractor to comply with such of the regulations in this part as may be applicable. In this regard, see 5.5 (a) of this subtitle.

U.S. Department of Housing and Urban Development Supplemental General Conditions

- 1. Enumeration of Plans, Specifications and Addenda
- 2. Stated Allowances
- 3. Special Hazards
- 4. Public Liability and Property Damage Insurance
- 5. Photographs of Projects
- 6. Schedule of Minimum Hourly Wage Rates
- 7. Builder's Risk Insurance
- 8. Special Equal Opportunity Provisions
- 9. Certification of Compliance with Air and Water Acts
- 10. Special Conditions Pertaining to Hazards, Safety Standards and Accident Prevention
1. Enumeration of Plans, Specifications and Addenda

2.

Following are the Plans, Specifications and Addenda which form a part of this contract, as set forth in Paragraph 1 of the General Conditions, "Contract and Contract Documents.

DRAWINGS				
General Construction:		Nos		
Heating and Ventilation	n:	Nos		
Plumbing:		Nos		
Electrical:		Nos		
		Nos		
		Nos		
SPECIFICATIONS				
General Construction:		Page	to	; incl.
Heating and Ventilation	n:	Page	to	; incl.
Plumbing:		Page	to	; incl.
Electrical:		Page	to	; incl.
		Page	to	; incl.
		Page	to	; incl.
ADDENDA:				
No	Date:	No	Date:	
No	Date:	No	Date:	
Stated Allowances				
Pursuant to Paragraph allowances in his prop	36 of the General Condi osal:	tions, the contractor	shall include the follow	ring cash
a. For	(Page	of Sp	ecifications) \$	
b. For	(Page	of Sp	ecifications) \$	
c. For	(Page	of Sp	ecifications) \$	
d. For	(Page	of Sp	ecifications) \$	
e. For	(Page	of Sp	ecifications) \$	
f. For	(Page	of Sp	ecifications) \$	

3. Special Hazards

The Contractor's and his Subcontractor's Public Liability and Property Damage Insurance shall provide adequate protection against the following special hazards:

4. Contractor's and Subcontractor's Public Liability, Vehicle Liability, and Property Damage Insurance

The Contractor shall either (1) require each of his subcontractors to procure and to maintain during the life of his subcontract, Subcontractor's Public Liability and Property Damage of the type and in the same amounts as specified in the preceding paragraph, or (2) insure the activities of his subcontractors in his own policy.

5. Photographs of Project

As provided in Paragraph 50 of the General Conditions, the Contractor will furnish photographs in the number, type, and stage as enumerated below:

6. Schedule of Occupational Classifications and Minimum Hourly Wage Rates as Required Under Paragraph 52 of the General Conditions

Given on Pages	,	and	1
5			

7. Builder's Risk Insurance

As provided in the General Conditions, Paragraph 28 (e), the Contractor $\[will will will not maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portions of the project for the benefit of the Owner, the Contractor, and all subcontractors, as their interest may appear.$

- 8. Special Equal Opportunity Provisions
 - A. Activities and Contracts Not Subject to <u>Executive Order 11246</u>, as Amended

(Applicable to Federally assisted construction contracts and related subcontracts \$10,000 and under)

During the performance of this contract, the Contractor agrees as follows:

- 1. The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor shall take affirmative action to ensure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following Employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
- 2. The Contractor shall post in conspicuous places, available to employees and applicants for employment, notices to be provided by Contracting Officer setting forth the provisions of this non-discrimination clause. The Contractor shall state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- 3. Contractors shall incorporate foregoing requirements in all subcontracts.
- B. Executive order 11246 (Contracts/subcontracts above \$10,000)
 - 1. Section 202 Equal Opportunity Clause

During the performance of this contract, the Contractor agrees as follows:

- (1.) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer, recruitment, or recruitment advertising; layoff or termination, rates or pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (2.) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration without regard to race, color, religion, sex, or national origin.
- (3.) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract understanding, a notice to be provided by the Contract Compliance Officer advising the said labor union or workers' representatives of the Contractor's commitment under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

- (4.) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- (5.) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Department and the Secretary of Labor for purposes of investigation, to ascertain compliance with such rules, regulations, and others.
- (6.) In the event of the Contractor's non-compliance with the non-discrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- (7.) The Contractor will include the provisions of the sentence immediately preceding Paragraph (1) and the provision of Paragraph (1) through (7) in every subcontract or purchase order unless exempt by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Department may direct as a means of enforcing such provisions, including sanctions for non-compliance. Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Department the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor in obtaining the compliance of Contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a Contractor debarred from, or who has not demonstrated eligibility for Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation

of the equal opportunity clause as may be imposed upon Contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee), refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurances of future compliance have been received from such applicant, and refer the case to the Department of Justice for appropriate legal proceedings.

- 2. <u>Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive</u> <u>Order 11246)</u>. (Applicable to contracts/subcontracts exceeding \$10,000.00)
 - 1. The Offerer's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
 - 2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

Goals for Minority Participation:	Goals for Female Participation:
12.7	6.9
Insert Goals:	Insert Goals for Current Year:

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographic area located outside of the covered area, it shall apply the goals established for such geographic area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction

The Contractor's compliance with the Executive Order and the regulation in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

- 4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county, and the city, if any).
- 3. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)
 - 1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United State Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
 - 2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
 - 3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

- 4. The Contractor shall implement the specific affirmative action standards provided in Paragraph 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.
- 5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
- 7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
 - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc., by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment sources, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- I. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

- n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
- o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractors' EEO policies and affirmative action obligations.
- q. Covered construction Contractors performing contracts in geographical area where they do not have a federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
- 8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through q). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through q of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation shall not be a defense for the Contractor's noncompliance.
- 9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
- 10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- 11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
- 12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

- 13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall precede in accordance with 41 CFR 60-4.8.
- 14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
- 15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- C. Certification of Nonsegregated Facilities (Over \$10,000)

By the submission of this bid, the bidder, offerer, applicant or subcontractor certifies that s/he does not maintain or provide for his/her employees any segregated facility at any of his/her establishments, and that s/he does not permit employees to perform their services at any location, under his/her control where segregated facilities are maintained. S/he certifies further that s/he will not maintain or provide for employees any segregated facilities at any of his/her establishments, and s/he will not permit employees to perform their services at any location under his/her control where segregated facilities are maintained. The bidder, offerer, applicant or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this proposed contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, * transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin, because of habit, local custom, or otherwise. S/he further agrees that (except where s/he has obtained identical certifications from proposed subcontractors for specific time periods) s/he will obtain identical certification from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause: that s/he will retain such certification in his/her files; and that s/he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods).

* Parking lots, drinking fountains, recreation or entertainment areas.

D. Section 3 – Contract Special Provisions Clause

The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3), contributes to the establishment of stronger, more sustainable communities by ensuring that employment and other economic opportunities generated by Federal financial assistance for housing and community development programs are, to the greatest extent feasible, directed toward low- and very low-income persons, particularly those who receive Federal financial assistance is expended.

The parties to this contract agree to comply with HUD's regulations in 24 CFR part 75, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 75 regulations.

The contractor agrees to send to each labor organization or representative or workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

The Contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 75, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 75. The Contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 75.

The Contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the Contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 75 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 75.

Noncompliance with HUD's regulations in 24 CFR part 75 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD assisted contracts.

9. Certification of Compliance with Air and Water Acts

(Applicable to Federally assisted construction contracts and related subcontracts exceeding \$100,000)

Compliance with Air and Water Acts

During the performance of this contract, the Contractor and all subcontractors shall comply with the requirements of the Clean Air Act, as amended, 42 USC 1857 et seq., the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq., and the regulations of the Environmental Protection Agency with respect thereto, at 40 CFR Part 15, as amended

In addition to the foregoing requirements, all nonexempt Contractors and subcontractors shall furnish to the owner, the following:

- (1.) A stipulation by the Contractor or subcontractors, that any facility to be utilized in the performance of any nonexempt contract or subcontract, is not listed on the list of Violating Facilities issued by the Environmental Protection Agency (EPA) pursuant to 40 CFR 15.20.
- (2.) Agreement by the Contractor to comply with all the requirements of Section 114 of the Clean air Act, as amended (42 USC 1857 c-8) and Section 308 of the Federal Water Pollution Control Act, as amended, (33 USC 1318) relating to inspection, monitoring, entry, reports and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued there under.
- (3.) A stipulation that as a condition for the award of the contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, EPA, indicating that a facility utilized, or to be utilized for the contract, is under consideration to be listed on the EPA List of Violating Facilities.

- (4.) Agreement by the Contractor that he will include, or cause to be included, the criteria and requirement in Paragraph (1) through (4) of this section in every nonexempt subcontract and requiring that the Contractor will take such action as the Government may direct as a means of enforcing such provisions.
- 10. Special Conditions Pertaining to Hazards, Safety Standards and Accident Prevention

A. <u>Lead-Based Paint Hazards</u>

(Applicable to contracts for construction or rehabilitation of residential structures)

The construction or rehabilitation of residential structures is subject to the HUD Lead-Based Paint regulations, 24 CFR Part 35. The Contractor and subcontractor shall comply with the provisions for the elimination of lead-based paint hazards under sub-part B of said regulations. The Owner will be responsible for the inspections and certifications required under section 35.14 (f) thereof.

B. <u>Use of Explosives</u>

When the use of explosives is necessary for the prosecution of the work the Contractor shall observe all local, state and Federal laws in purchasing and handling explosives. The Contractor shall take all necessary precaution to protect completed work, neighboring property, waterlines, or there underground structures. Where there is danger to structures or property from blasting, the charges shall be reduced and the material shall be covered with suitable timber, steel or rope mats.

The Contractor shall notify all owners of public utility property of intention to use explosives at least eight hours before blasting is done, close to such property. Any supervision or direction of use of explosives by the Engineer does not in any way reduce the responsibility of the Contractor or his Surety for Damages that may be caused by such use.

C. <u>Danger Signals and Safety Devices</u> (Modify as required)

The Contractor shall make all necessary precautions to guard against damages to property and injury to persons. He shall put up and maintain in good condition, sufficient red or warning lights at night, suitable barricades and other devices necessary to protect the public. In case the Contractor fails or neglects to take such precautions, the Owner may have such lights and barricades installed and charge the cost of this work to the Contractor. Such action by the Owner does not relieve the Contractor of any liability incurred under these specifications or contract.

D. <u>Appendix 1 – Summary of Civil Rights Laws, Executive Orders and Regulations</u>

The listing in Appendix 1 (to be inserted before wage rates) is applicable to all Federally assisted projects and are made a part of these Conditions.

Wage Rate Determination

Appropriate Wage Rates shall be inserted here.

Technical Specifications

Technical Specifications shall be inserted behind Wage Rates.

Attachment to Bid Specifications

In addition to the rules and regulations mentioned previously herein, the Contractor hereby is notified of the following requirements regarding civil rights.

Title VIII of the Civil Rights Act of 1968, as amended

Title VIII of the Civil Rights Act of 1968 provides that no person shall, on the basis of race, color, religion, national origin, handicap or familial status, be discriminated against in housing (and related facilities) provided with Federal assistance or leading practices with respect to residential property when such practices are connected with loans insured or guaranteed by the Federal Government.

<u>Section 503 of Rehabilitation Act of 1973</u>, as amended, provides for the nondiscrimination in Contractor employment. All recipients of Federal funds must certify to the following through all contracts issued:

Affirmative Action for Handicapped Workers

- a. The Contractor will not discriminate against any employee or regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: Employment upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.
- b. The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.
- c. In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.
- d. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.
- e. The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.
- f. The Contractor will include the provisions of this clause in every subcontract or purchase order of \$2,500 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontractor or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

<u>Section 504 of the Rehabilitation Act of 1973</u>, as amended, provides for nondiscrimination of an otherwise qualified individual solely on the basis of his/her handicap in benefiting from any program or activity receiving Federal financial assistance. All recipients must certify to compliance with all provisions of this Section.

Age Discrimination Act of 1975

No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under, any program or activity receiving Federal financial assistance.

<u>Section 912 of the Cranston-Gonzales National Affordable Housing Act</u> amended Section 109 (a) of the HCD Act to prohibit discrimination on the basis of religion.

Kansas Act Against Discrimination

It is a policy of the State of Kansas that requires all employers, labor organizations, employment agencies, realtors, financial institutions, or other persons covered by this Act to assure equal opportunities and encourage every citizen regardless of race, religion, color, sex, age, physical disability, national origin, or ancestry, to secure and hold – without discrimination, segregation, or separation – employment in any field of work or labor for which they are properly qualified, the opportunity for full and equal public accommodations, and to assure full and equal opportunities in housing.

E-Verify Contract Language for New Agreements:

Contract Clause:

Vendor/Contractor shall utilize the U.S. Department of Homeland Security's E-Verify system to confirm the employment eligibility of all persons employed by the Vendor/Contractor during the term of the Contract to perform employment duties within Kansas and all persons, including subcontractors, assigned by the Vendor/Contractor to perform work pursuant to the contract with the client.

E-VERIFY

Project No:
City/County of
Project Description:

Vendor/Consultant acknowledges and agrees to the following:

Vendor/Consultant shall utilize the U.S. Department of Homeland Security's E-Verify system, in accordance with the terms governing use of the system, to confirm the employment eligibility of;

- 1. all persons employed by the Vendor/Consultant during the term of the Contract to perform employment duties within Kansas; and
- 2. all persons, including subcontractors, assigned by the Vendor/Consultant to perform work pursuant to the contract with the client.

Company/Firm:	
Authorized Signature:	
Title:	
Date:	

WAGE RATE DETERMINATION

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The Proposal and this Contract shall be based upon payment by the Contractor and his subcontractors of wage rates not less than the prevailing hourly wage rate for each craft or classification of workman engaged on the work. Prevailing wage rates shall be as determined by the United States Secretary of Labor. The Wage Rate Determination is bound herein and made part hereof.

A copy of the wage rate determination shall be kept posted by the Contractor in a prominent and easily accessible place at the project site where it can be easily seen by the workers. Such notice shall remain posted during the full time that any workman shall be employed on the Project.

FEDERAL LABOR STANDARDS PROVISIONS – HUD 4010

Wage and Hour Division (WHD)

Civil Money Penalty Inflation Adjustments

On November 2, 2015, President Obama signed into law the Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015 to advance the effectiveness of civil money penalties and to strengthen their deterrent effect. Outdated penalties are a problem because civil penalties are less effective when they do not keep pace with the cost of living. Penalties deter violations of the important laws that we enforce, which not only result in safer, more productive workplaces, but also in a more level playing field for responsible employers who have to compete with the minority who try to save money by evading the law. That is why this law modernizing many penalties that have long lost ground to inflation is critical.

The new law directs agencies across the federal government to adjust their penalties for inflation each year in January. Additionally, it directs all agencies to issue a "catch up" penalty adjustment, which must be effective by August 1, 2016. Congress capped the "catch up" increase at 150 percent of the current penalty to ensure that these increases are reasonable and manageable.

Below is a table that reflectsPlea the adjustments that have occurred since the 2015 law was passed. For more information on the adjustment law and rules, please go <u>here</u>.

Type of Violation	Statutory Citation	CFR Citation	Maximum Civil Monetary Penalty before 8/1/2016	Maximum Civil Monetary Penalty after 8/1/2016
(1) Failure to pay laborers and mechanics at a rate not less than one and one-half times their basic rate of pay	40 USC 3702(c)	29 CFR 5.8(a) and 29 CFR 5.5(b)(2)	\$10	\$25

Contract Work Hours and Safety Standards Act (CWHSSA)

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

PREVAILING WAGES	You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.
OVERTIME	You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.
ENFORCEMENT	Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.
APPRENTICES	Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.
PROPER PAY	If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



WH 1321(Revised April 2009)

EMPLOYEE POLYGRAPH PROTECTION ACT

The Employee Polygraph Protection Act prohibits most private employers from using lie detector tests either for pre-employment screening or during the course of employment.

PROHIBITIONS

Employers are generally prohibited from requiring or requesting any employee or job applicant to take a lie detector test, and from discharging, disciplining, or discriminating against an employee or prospective employee for refusing to take a test or for exercising other rights under the Act.

EXEMPTIONS Federal, State and local governments are not affected by the law. Also, the law does not apply to tests given by the Federal Government to certain private individuals engaged in national security-related activities.

The Act permits polygraph (a kind of lie detector) tests to be administered in the private sector, subject to restrictions, to certain prospective employees of security service firms (armored car, alarm, and guard), and of pharmaceutical manufacturers, distributors and dispensers.

The Act also permits polygraph testing, subject to restrictions, of certain employees of private firms who are reasonably suspected of involvement in a workplace incident (theft, embezzlement, etc.) that resulted in economic loss to the employer.

The law does not preempt any provision of any State or local law or any collective bargaining agreement which is more restrictive with respect to lie detector tests.

EXAMINEE RIGHTS Where polygraph tests are permitted, they are subject to numerous strict standards concerning the conduct and length of the test. Examinees have a number of specific rights, including the right to a written notice before testing, the right to refuse or discontinue a test, and the right not to have test results disclosed to unauthorized persons.

ENFORCEMENT The Secretary of Labor may bring court actions to restrain violations and assess civil penalties against violators. Employees or job applicants may also bring their own court actions.

THE LAW REQUIRES EMPLOYERS TO DISPLAY THIS POSTER WHERE EMPLOYEES AND JOB APPLICANTS CAN READILY SEE IT.





WAGE AND HOUR DIVISION UNITED STATES DEPARTMENT OF LABOR **1-866-487-9243** TTY: 1-877-889-5627 www.dol.gov/whd



WH1462 REV 07/16

Equal Employment Opportunity is

Private Employers, State and Local Governments, Educational Institutions, Employment Agencies and Labor Organizations

Applicants to and employees of most private employers, state and local governments, educational institutions, employment agencies and labor organizations are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Title VII of the Civil Rights Act of 1964, as amended, protects applicants and employees from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment, on the basis of race, color, religion, sex (including pregnancy), or national origin. Religious discrimination includes failing to reasonably accommodate an employee's religious practices where the accommodation does not impose undue hardship.

DISABILITY

Title I and Title V of the Americans with Disabilities Act of 1990, as amended, protect qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship.

AGE

The Age Discrimination in Employment Act of 1967, as amended, protects applicants and employees 40 years of age or older from discrimination based on age in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment.

SEX (WAGES)

In addition to sex discrimination prohibited by Title VII of the Civil Rights Act, as amended, the Equal Pay Act of 1963, as amended, prohibits sex discrimination in the payment of wages to women and men performing substantially equal work, in jobs that require equal skill, effort, and responsibility, under similar working conditions, in the same establishment.

GENETICS

Title II of the Genetic Information Nondiscrimination Act of 2008 protects applicants and employees from discrimination based on genetic information in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. GINA also restricts employers' acquisition of genetic information and strictly limits disclosure of genetic information. Genetic information includes information about genetic tests of applicants, employees, or their family members; the manifestation of diseases or disorders in family members (family medical history); and requests for or receipt of genetic services by applicants, employees, or their family members.

RETALIATION

All of these Federal laws prohibit covered entities from retaliating against a person who files a charge of discrimination, participates in a discrimination proceeding, or otherwise opposes an unlawful employment practice.

WHAT TO DO IF YOU BELIEVE DISCRIMINATION HAS OCCURRED

There are strict time limits for filing charges of employment discrimination. To preserve the ability of EEOC to act on your behalf and to protect your right to file a private lawsuit, should you ultimately need to, you should contact EEOC promptly when discrimination is suspected:

The U.S. Equal Employment Opportunity Commission (EEOC), 1-800-669-4000 (toll-free) or 1-800-669-6820 (toll-free TTY number for individuals with hearing impairments). EEOC field office information is available at www.eeoc.gov or in most telephone directories in the U.S. Government or Federal Government section. Additional information about EEOC, including information about charge filing, is available at www.eeoc.gov.

Employers Holding Federal Contracts or Subcontracts

Applicants to and employees of companies with a Federal government contract or subcontract are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits job discrimination on the basis of race, color, religion, sex or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

DISABLED, RECENTLY SEPARATED, OTHER PROTECTED, AND ARMED FORCES SERVICE MEDAL VETERANS

The Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits job discrimination and requires affirmative action to employ and advance in employment disabled veterans, recently separated veterans (within

three years of discharge or release from active duty), other protected veterans (veterans who served during a war or in a campaign or expedition for which a campaign badge has been authorized), and Armed Forces service medal veterans (veterans who, while on active duty, participated in a U.S. military operation for which an Armed Forces service medal was awarded).

RETALIATION

Retaliation is prohibited against a person who files a complaint of discrimination, participates in an OFCCP proceeding, or otherwise opposes discrimination under these Federal laws.

Any person who believes a contractor has violated its nondiscrimination or affirmative action obligations under the authorities above should contact immediately:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (toll-free) or (202) 693-1337 (TTY). OFCCP may also be contacted by e-mail at OFCCP-Public@dol.gov, or by calling an OFCCP regional or district office, listed in most telephone directories under U.S. Government, Department of Labor.

Programs or Activities Receiving Federal Financial Assistance

RACE, COLOR, NATIONAL ORIGIN, SEX

In addition to the protections of Title VII of the Civil Rights Act of 1964, as amended, Title VI of the Civil Rights Act of 1964, as amended, prohibits discrimination on the basis of race, color or national origin in programs or activities receiving Federal financial assistance. Employment discrimination is covered by Title VI if the primary objective of the financial assistance is provision of employment, or where employment discrimination causes or may cause discrimination in providing services under such programs. Title IX of the Education Amendments of 1972 prohibits employment discrimination on the basis of sex in educational programs or activities which receive Federal financial assistance.

INDIVIDUALS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973, as amended, prohibits employment discrimination on the basis of disability in any program or activity which receives Federal financial assistance. Discrimination is prohibited in all aspects of employment against persons with disabilities who, with or without reasonable accommodation, can perform the essential functions of the job.

If you believe you have been discriminated against in a program of any institution which receives Federal financial assistance, you should immediately contact the Federal agency providing such assistance.

La igualdad de oportunidades de empleo es



Empleadores privados, gobiernos locales y estatales, instituciones educativas, agencias de empleo y organizaciones de trabajo

Los postulantes y empleados de la mayoría de los empleadores privados, los gobiernos locales y estatales, las instituciones educativas, las agencias de empleo y las organizaciones de trabajo están protegidos por la ley federal contra la discriminación en función de:

RAZA, COLOR, RELIGIÓN, SEXO, PROCEDENCIA

El Título VII de la Ley de Derechos Civiles (Civil Rights Act) de 1964, con sus modificaciones, protege a los postulantes y a los empleados contra la discriminación en lo que respecta a la contratación, los ascensos, los despidos, los pagos, las compensaciones adicionales, la capacitación laboral, la clasificación, las referencias y los demás aspectos del empleo, en función de raza, color, religión, sexo (incluidas las embarazadas) o procedencia. La discriminación religiosa se refiere a la falta de adaptación razonable a las prácticas religiosas de un empleado, siempre y cuando dicha adaptación no provoque una dificultad económica desmedida para la compañía.

DISCAPACIDAD

Los Títulos I y V de la Ley de Estadounidenses con Discapacidades (Americans with Disabilities Act) de 1990, con sus modificaciones, protege a las personas idóneas contra la discriminación por discapacidad en lo que respecta a la contratación, los ascensos, los despidos, los pagos, las compensaciones adicionales, la capacitación laboral, la clasificación, las referencias y los demás aspectos del empleo. La discriminación por discapacidad se refiere a la falta de adaptaciones razonables para las limitaciones físicas o mentales de una persona idónea que tiene una discapacidad y que es un postulante o un empleado, salvo que dichas adaptaciones provoquen una dificultad económica desmedida para la compañía.

EDAD

La Ley contra la Discriminación Laboral por Edad (Age Discrimination in Employment Act) de 1967, con sus modificaciones, protege a los postulantes y empleados de 40 años o más contra la discriminación por cuestiones de edad en lo que respecta a la contratación, los ascensos, los despidos, los pagos, las compensaciones adicionales, la capacitación laboral, la clasificación, las referencias y los demás aspectos del empleo.

SEXO (SALARIOS)

Además de lo establecido en el Título VII de la Ley de Derechos Civiles, con sus modificaciones, la Ley de Igualdad en las Remuneraciones (Equal Pay Act) de 1963, con sus modificaciones, también prohíbe la discriminación sexual en el pago de los salarios a las mujeres y los hombres que realicen básicamente el mismo trabajo, en empleos que requieran las mismas habilidades, esfuerzo y responsabilidad, en condiciones laborales similares, en el mismo establecimiento.

GENÉTICA

El Título II de la Ley de No Discriminación por Información Genética (Genetic Information Nondiscrimination Act, GINA) de 2008 protege a los postulantes y empleados contra la discriminación basada en la información genética en lo que respecta a la contratación, los ascensos, los despidos, los pagos, las compensaciones adicionales, la capacitación laboral, la clasificación, las referencias y los demás aspectos del empleo. La GINA también limita la adquisición de información genética por parte de los empleadores y condiciona de manera estricta su divulgación. La información genética incluye las pruebas genéticas de los postulantes, empleados o integrantes de sus familias, la manifestación de enfermedades o trastornos de los miembros de la familia (historia médica familiar) y las solicitudes o la recepción de servicios genéticos por parte de los postulantes, empleados o integrantes de sus familias.

REPRESALIAS

Todas estas leyes federales prohíben a las entidades cubiertas que tomen represalias en contra de una persona que presenta una cargo por discriminación, participa en un procedimiento por discriminación o que, de algún otro modo, se opone a una práctica laboral ilícita.

QUÉ DEBE HACER SI CONSIDERA QUE ES VÍCTIMA DE LA DISCRIMINACIÓN

Existen plazos estrictos para presentar cargos por discriminación laboral. A fin de preservar la capacidad de la Comisión para la Igualdad de Oportunidades en el Empleo (Equal Employment Opportunity Commission, EEOC) de actuar en representación suya y proteger su derecho a iniciar una demanda privada si fuese necesario en última instancia, debe comunicarse con la EEOC apenas sospeche que se produjo un hecho de discriminación: Comisión para la Igualdad de Oportunidades en el Empleo de los Estados Unidos, 1-800-669-4000 (línea gratuita) o 1-800-669-6820 (línea gratuita TTY para las personas con problemas auditivos). Puede encontrar información sobre las sucursales de la EEOC en www.eeoc.gov o en la mayoría de las guías telefónicas en la sección Gobierno Federal o Gobierno de los Estados Unidos, También puede obtener información adicional sobre la EEOC, incluso cómo presentar un cargo, en www.eeoc.gov.

Empleadores que tengan contratos o subcontratos con el gobierno federal

Los postulantes y empleados de las compañías que tengan un contrato o subcontrato con el gobierno federal están protegidos por la ley federal contra la discriminación en función de:

RAZA, COLOR, RELIGIÓN, SEXO, PROCEDENCIA

El Decreto Ejecutivo 11246, con sus modificaciones, prohíbe la discriminación en el trabajo en función de raza, color, religión, sexo o procedencia y exige que se implementen acciones afirmativas para garantizar la igualdad de oportunidades en todos los aspectos laborales.

PERSONAS CON DISCAPACIDADES

La Sección 503 de la Ley de Rehabilitación *(Rehabilitation Act)* de 1973, con sus modificaciones, protege a las personas idóneas contra la discriminación por discapacidad en lo que respecta a la contratación, los ascensos, los despidos, los pagos, las compensaciones adicionales, la capacitación laboral, la clasificación, las referencias y los demás aspectos del empleo. La discriminación por discapacidad se refiere a la falta de adaptaciones razonables para las limitaciones físicas o mentales de una persona idónea que tiene una discapacidad y que es un postulante o un empleado, salvo que dichas adaptaciones provoquen una dificultad económica desmedida para la compañía. La Sección 503 también exige que los contratistas federales implementen acciones afirmativas para emplear y avanzar en el empleo de personas idóneas con discapacidades en todos los niveles laborales, incluido el nivel ejecutivo.

VETERANOS DISCAPACITADOS, RECIÉN RETIRADOS, BAJO PROTECCIÓN Y CON MEDALLA POR SERVICIO A LAS FUERZAS ARMADAS

La Ley de Asistencia a la Readaptación de Veteranos de Vietnam *(Vietnam Era Veterans' Readjustment Assistance Act)* de 1974, con sus modificaciones, 38 U.S.C. 4212, prohíbe la discriminación laboral y exige que se implementen acciones afirmativas para emplear y avanzar en el empleo de los veteranos discapacitados, recién retirados

(en el plazo de los tres años posteriores a la baja o al cese del servicio activo), otros veteranos bajo protección (los veteranos que prestaron servicio durante una guerra o en una campaña o expedición para la cual se les autorizó una insignia de campaña) y los veteranos con medalla por servicio a las Fuerzas Armadas (aquellos que durante el servicio activo, participaron en una operación militar de los Estados Unidos por la cual se los reconoció con una medalla por servicio a las Fuerzas Armadas).

REPRESALIAS

Quedan prohibidas las represalias contra una persona que presenta una demanda por discriminación, participa en un procedimiento de la Oficina de Programas de Cumplimiento de Contratos Federales (*Office of Federal Contract Compliance Programs*, OFCCP) o que se oponga, de algún otro modo, a la discriminación según estas leyes federales.

Toda persona que considere que un contratista violó sus obligaciones de acción afirmativa o no discriminación según las autoridades mencionadas anteriormente debe comunicarse de inmediato con:

La Oficina de Programas de Cumplimiento de Contratos Federales (OFCCP), Departamento de Trabajo de los Estados Unidos, 200 Constitution Avenue, N.W., Washington, D.C. 20210, teléfono 1-800-397-6251 (línea gratuita) o (202) 693-1337 (línea TTY). También puede enviar un mensaje de correo electrónico a la OFCCP (OFCCP-Public@dol.gov) o bien, llamar a una de sus oficinas regionales o del distrito, las cuales aparecen en la mayoría de las guías telefónicas en la sección Gobierno de los Estados Unidos, Departamento de Trabajo.

Programas o actividades que reciben asistencia financiera federal

RAZA, COLOR, PROCEDENCIA, SEXO

Además de las protecciones establecidas en el Título VII de la Ley de Derechos Civiles de 1964 y sus modificaciones, el Título VI de dicha ley, con sus modificaciones, prohíbe la discriminación por raza, color o procedencia en los programas o las actividades que reciban asistencia financiera federal. La discriminación laboral está cubierta por el Título VI si el objetivo principal de la asistencia financiera es brindar empleo, o si la discriminación laboral provoca o puede provocar discriminación cuando se proporcionan los servicios de dichos programas. El Título IX de las Reformas Educativas de 1972 prohíbe la discriminación laboral según el sexo en los programas o las actividades educativas que reciben asistencia financiera federal. PERSONAS CON DISCAPACIDADES

La Sección 504 de la Ley de Rehabilitación de 1973, con sus modificaciones, prohíbe la discriminación laboral por discapacidad en cualquier programa o actividad que reciba asistencia financiera federal. Queda prohibida la discriminación en todos los aspectos laborales contra las personas discapacitadas que, con o sin adaptaciones razonables, pueden desempeñar las funciones esenciales del trabajo.

Si cree que ha sido víctima de discriminación en algún programa de una institución que reciba asistencia financiera federal, debe comunicarse de inmediato con la agencia federal que brinda dicha asistencia.

Versiones utilizables de la EEOC 9/02 y la OFCCP 8/08 con el Suplemento 11/09





Job Safety and Health IT'S THE LAW!

All workers have the right to:

- A safe workplace.
- Raise a safety or health concern with your employer or OSHA, or report a workrelated injury or illness, without being retaliated against.
- Receive information and training on job hazards, including all hazardous substances in your workplace.
- Request an OSHA inspection of your workplace if you believe there are unsafe or unhealthy conditions. OSHA will keep your name confidential. You have the right to have a representative contact OSHA on your behalf.
- Participate (or have your representative participate) in an OSHA inspection and speak in private to the inspector.
- File a complaint with OSHA within 30 days (by phone, online or by mail) if you have been retaliated against for using your rights.
- See any OSHA citations issued to your employer.
- Request copies of your medical records, tests that measure hazards in the workplace, and the workplace injury and illness log.

This poster is available free from OSHA.

Employers must:

- Provide employees a workplace free from recognized hazards. It is illegal to retaliate against an employee for using any of their rights under the law, including raising a health and safety concern with you or with OSHA, or reporting a work-related injury or illness.
- Comply with all applicable OSHA standards.
- Report to OSHA all work-related fatalities within 8 hours, and all inpatient hospitalizations, amputations and losses of an eye within 24 hours.
- Provide required training to all workers in a language and vocabulary they can understand.
- Prominently display this poster in the workplace.
- Post OSHA citations at or near the place of the alleged violations.

FREE ASSISTANCE to identify and correct hazards is available to small and mediumsized employers, without citation or penalty, through OSHA-supported consultation programs in every state.



Contact OSHA. We can help.

1-800-321-OSHA (6742) • TTY 1-877-889-5627 • www.osha.gov





Seguridad y Salud en el Trabajo ¡ES LA LEY!

Todos los trabajadores tienen el derecho a:

- Un lugar de trabajo seguro.
- Decir algo a su empleador o la OSHA sobre preocupaciones de seguridad o salud, o reportar una lesión o enfermedad en el trabajo, sin sufrir represalias.
- Recibir información y entrenamiento sobre los peligros del trabajo, incluyendo sustancias toxicas en su sitio de trabajo.
- Pedirle a la OSHA inspeccionar su lugar de trabajo si usted cree que hay condiciones peligrosas o insalubres. Su información es confidencial. Algún representante suyo puede comunicarse con OSHA a su nombre.
- Participar (o su representante puede participar) en la inspección de OSHA y hablar en privado con el inspector.
- Presentar una queja con la OSHA dentro de 30 días (por teléfono, por internet, o por correo) si usted ha sufrido represalias por ejercer sus derechos.
- Ver cualquieras citaciones de la OSHA emitidas a su empleador.
- Pedir copias de sus registros médicos, pruebas que miden los peligros en el trabajo, y registros de lesiones y enfermedades relacionadas con el trabajo.

Este cartel está disponible de la OSHA para gratis.

Los empleadores deben:

- Proveer a los trabajadores un lugar de trabajo libre de peligros reconocidos. Es ilegal discriminar contra un empleado quien ha ejercido sus derechos bajo la ley, incluyendo hablando sobre preocupaciones de seguridad o salud a usted o con la OSHA, o por reportar una lesión o enfermedad relacionada con el trabajo.
- Cumplir con todas las normas aplicables de la OSHA.
- Reportar a la OSHA todas las fatalidades relacionadas con el trabajo dentro de 8 horas, y todas hospitalizaciones, amputaciones y la perdida de un ojo dentro de 24 horas.
- Proporcionar el entrenamiento requerido a todos los trabajadores en un idioma y vocabulario que pueden entender.
- Mostrar claramente este cartel en el lugar de trabajo.
- Mostrar las citaciones de la OSHA acerca del lugar de la violación alegada.

Los empleadores de tamaño pequeño y mediano pueden recibir ASISTENCIA GRATIS para identificar y corregir los peligros sin citación o multa, a través de los programas de consultación apoyados por la OSHA en cada estado.



Llame OSHA. Podemos ayudar.

1-800-321-0SHA (6742) • TTY 1-877-889-5627 • www.osha.gov

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(40 U.S.C § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the proceeding week." U.S. Department of Lacor (DOL) regulations at 29 G.F.R. § 5.6(a)(3)(i) require contractors to submit weekly a copy of all psyrolls to the Federal agency contracting to or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid on the statement and the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and finge benefits

Public Bunden Statement

We estimate that is will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching eacting data sources, gathering and mentioning the data needed, and completing and reviewing the collection of information. If you have any comments regaring these estimates or any other aspect of this collection, including suggestions for reducing this builden, send them to the Administrator, Wage and How Division, U.S. Department of Labor, Room \$3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

(over)

Appendix La

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

(18te)

(Name of Signatory Party)

Date

Each laborer or mechanic listed in the above referenced payroli has been paid, as indicated on the payroli, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required thinge benefits as listed in the contract, except as noted in section 4(c) helow. 1

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	EXPLANATION
REBARKS	
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In addition to the basic hourly wage rates paid to each laborer or mechanic liste the above referenced payroli, payments of fringe benefits as listed in the cont have been or will be made to appropria te programs for the benefit of s employees, except as noted in section 4(c) below. 8

do hereby state	
it) That I pay or supervise the payment of the persons employed by	(c)
(Contractor or Subcontractor) on the	
; that during the payod period commencing on the	
(Building or Work)	
day of and ending the day of	
ail persons employed on s aid project have been paid the full weekly wages earned. Ithat no rebates have been or will be made ether directly to or on behaif of said	
from the full	
(Contractor or Subcontractor)	
weekly wages earned by any person and that no deductions have been m ade either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations. Part 3 (20 C.F.R. Subhile A), issued by the Secretary of Labor under the Copeland Aci as amended (48 Stat. 948) is 3 secret 103.7.2 star 647.7 star 347.3 for 11.5 C. 6.3 stars, and decorbant helow.	
	REMARK
(2) That any payrols otherwise under this contract required to be submitted for the above period are correct and complete. That the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage det emination incorporated int or the contrained in any wage det emination incorporated int or the contrained in any the classifications set forth therein for each laborer or mechanic contourn with the work he performed.	
(3) That any apprent ices am ployed int he abov epenod are duly registered in a bons fide apprenticeship program regis tened with a S1 ate apprent iceship agency recognized by the Bureau of Apprenticeship and Training United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training. United States Department of Labor.	
(4) That (a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS. FUNDS, OR PROGRAMS	tailable ad

Community Development Block Grant

Department of Labor Wage and Hour Division

INSTRUCTIONS FOR COMPLETING PAYROLL FORM, WH-347

General: The use of the WH-347 payroll form is not mandatory. This form has been made available for the convenience of contractors and subcontractors required by their Federal or Federally-aided construction-type contracts and subcontracts to submit weekly payrolls. Properly filled out, this form will satisfy the requirements of Regulations, Parts 3 and 5 (29 CFR, Subtitle A), as to payrolls submitted in connection with contracts subject to the Davis-Bacon and related Acts.

This form meets needs resulting from the amendment of Davis-Bacon Act to include fringe benefits provisions. Under this amended law, the contractor is required to pay not less than fringe benefits as predetermined by the Department of Labor, in addition to payment of not less than the predetermined rates. The contractor's obligation to pay fringe benefits may be met either by payment of the fringes to the various plans, funds or programs or by making these payments to the employees as cash in lieu of fringes.

This payroll provides for the contractor's showing on the face of the payroll all monies to the employees, whether as basic rates or as cash in lieu of fringes and provides for the contractor's representation in the statement of compliance on the rear of the payroll that he is paying to other fringes required by the contract and not paid as cash in lieu of fringes. Detailed instructions concerning the preparation of the payroll follow:

Contractor or Subcontractor: Fill in your firm's name and check appropriate box.

Address: Fill in your firm's address.

Column 1 - Name, Address and Social Security Number of Employee: The employee's full name and Social Security Number must be shown on each weekly payroll submitted. The employee's address must also be shown on the payroll covering the first week in which the employee works on the project. The address need not be shown on subsequent weekly payrolls unless his address changes.

Column 2 - Withholding Exemptions: This column is merely inserted for the employer's convenience and is not a requirement of Regulations, Parts 3 and 5.

Column 3 - Work Classifications: List classification description of work actually performed by employees. Consult classification and minimum wage schedule set forth in contract specifications. If additional classifications are deemed necessary, see Contracting Officer or Agency representative. Employee may be shown as having worked in more than one classification provided accurate breakdown or hours so worked is maintained and shown on submitted payroll by use of separate entries.

Column 4 - Hours Worked: On all contracts subject to the Contract Work Hours Standard Act enter as overtime hours worked in excess of 40 hours a week.

Column 5 - Total: Self-explanatory

Column 6 - Rate of Pay, including fringe benefits: In straight time box, list actual hourly rate paid the employee for straight time worked plus any cash in lieu of fringes paid the employee. When recording the straight time hourly rate, any cash paid in lieu of fringes may be shown separately from the basic rate, thus \$5.00/.5. This is of assistance in correctly computing overtime. See "fringe benefits" below. In overtime box shown overtime hourly rate paid, plus any cash in lieu of fringes paid the employee. See "fringe benefits" below. Payment of not less than time and one-half the basic or regular rate paid is required for overtime under the Contract Work Hours Standard Act of 1962. In addition to paying no less than the predetermined rate for the classification which the employee works, the contractor shall pay to approved plans, funds, or programs or shall pay as cash in lieu of fringes, amounts predetermined as fringe benefits in the wage decision made part of the contract. See "fringe benefits" below.

Fringe Benefits - Contractors who pay all required fringe benefits: A contractor who pays fringe benefits to approved plans, funds or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor shall continue to show on the face of the payroll the basic cash hourly rate and overtime rate paid to his employees just as he has always done. Such a contractor shall check paragraph 4(a) of the statement on the reverse of the payroll to indicate that he is also paying to approved plans, funds or programs not less than the amount predetermined as fringe benefits for each craft. Any exceptions shall be noted in section 4(c).

Contractors who pay no fringe benefits: A contractor who pays no fringe benefits shall pay to the employee, and insert in the straight time hourly rate column of the payroll, an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the applicable wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringes, the overtime rate shall be not less than the sum of the basic predetermined rate, plus the half time premium on basic or regular rate, plus the required cash in lieu of fringes at the straight time rate. In addition, the contractor shall check paragraph 4(b) of the statement on the reverse of the payroll to indicate that he is paying fringe benefits in cash directly to his employees. Any exceptions shall be noted in Section 4(c).

Use of Section 4(c), Exceptions

Any contractor who is making payment to approved plans, funds or programs in amounts less than the wage determination required is obliged to pay the deficiency directly to the employees as cash in lieu of fringes. Any exceptions to Section 4(a) or 4(b), whichever the contractor may check, shall be entered in section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid the employee as cash in lieu of fringes and the hourly amount paid to plans, funds, or programs as fringes. The contractor shall pay, and shall show that he is paying to each such employee for all hours (unless otherwise provided by applicable determination) worked on Federal or Federally assisted project an amount not less than the predetermined rate plus cash in lieu of fringes as shown in Section 4(c). The rate paid and amount of cash paid in lieu of fringe benefits per hour should be entered in column 6 on the payroll. See paragraph on, "Contractors who pay no fringe benefits" for computation of overtime rate.

Column 7 - Gross Amount Earned: Enter gross amount earned on this project. If part of the employees' weekly wage was earned on projects other than the project described on this payroll,

enter in column 7 first the amount earned on the Federal or Federally assisted project and then the gross amount earned during the week on all projects, thus \$63.00/\$120.00.

Column 8 - Deductions: Five columns are provided for showing deductions made. If more than five deductions should be involved, use first 4 columns; show the balance deductions under "Other" column; show actual total under "Total Deductions" column; and in the attachment to the payroll describe the deduction contained in the "Other" column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 CFR, Part 3. If the employee worked on other jobs in addition to this project, show actual deductions from his weekly gross wage, but indicate that deductions are based on his gross wages.

Column 9 - Net Wages Paid for Week: Self-explanatory

Totals - Space has been left at the bottom of the columns so that totals may be shown if the contractor so desires.

Statement Required by Regulations, Parts 3 and 5: While this form need not be notarized, the statement on the back of the payroll is subject to the penalties provided by 18 USV 1001, namely, possible imprisonment of five (5) years or \$10,000.00 fine or both. Accordingly, the party signing this statement should have knowledge of the facts represented as true.

Space has been provided between items (1) and (2) of the statement for describing any deductions made. If all deductions made are adequately described in the "Deductions" column above, state "See Deductions column in this payroll." See paragraph entitled "FRINGE BENEFITS" above for instructions concerning filling out paragraph 4 of the statement.



July 22, 2005

To All Community Development Block Grant (CDBG) Entitlement Communities/State CDBG and HOME Program

SUBJECT: Labor Standards Compliance Requirements for Self-Employed Laborers and Mechanics (aka Working Subcontractors) listed on Certified Payroll Reports (CPR's)

Labor Relations Letter LR-96-01 represents an effort to provide guidance for all principal contractors (also referred to as the prime contractor) is responsible for the full compliance of all employers (contractors, subcontractors, and any lower-tier subcontractors) with the labor standards provisions applicable to the project. For ease in reference, the term "prime contractor" shall mean the principal contractor, the term "subcontractor" shall mean all subcontractors and lower-tier subcontractors, and the term "employer" shall mean any contractor, subcontractor or lower-tier subcontractor that has engaged the services of laborers or mechanics on the project.

HUD policy clearly affords prevailing wage protection for all laborers and mechanics, regardless of contractual relationship. There is no exception to this protection for self-employed laborers or mechanics, including owners of businesses, sole-proprietors, partners, corporate officers, or others. This policy in no way precludes or limits any business or individual from participating in HUD-assisted construction work. The issue is not one of *eligibility*, whether such persons are permitted to work on HUD-assisted projects, but of compliance standards – what HUD will accept from contractors and subcontractors to demonstrate that proper compliance has been achieved.

In this context, this *Letter* establishes a HUD administrative policy that laborers and mechanics may not certify to the payment of their **own** prevailing wages **EXCEPT** where the laborer or mechanic is the owner of a business working on the site of the work with his/her own crew. (This exception is described in detail in Paragraph III. <u>Owners of</u> businesses working with their crew.

Owners of businesses working with their crew on the same HUD-assisted job site may certify to the payment of their own prevailing wages in conjunction with the prevailing wages paid to their employees. This exception to reporting standards *does not* suggest that such owners are not likewise entitled to prevailing wages for their labor. Rather, it accepts the wage payment certification on weekly payroll reports by the owner for his/her own wages as that certification *accompanies* the certification offered for the payment of prevailing wages to his/her employees. Such owners need only list their name, work classification including "owner," and the daily and total hours worked. (Such owners *do not* need to list a rate of pay or amounts earned.) Also, HUD's Office of Labor Relations responsible for labor standards administration and enforcement *may not* accept certified payrolls reporting single or multiple owners (e.g., partners) certifying that they have paid to themselves the prevailing wage for their craft. For example, a sole-proprietor may not submit a payroll reporting himself or herself as simply "**Owner**" signing the certification as to his/her own wage payment from "draws" or other payment methods. Neither may several mechanics submit a payroll reporting themselves as "partners" with one or more certifying as to the payment of their wages or salaries. Such mechanics must instead be carried on the certified payroll of the contractor or subcontractor (the "responsible employer") for whom they are working and with whom they have executed a "contract" for services.

Enclosed is a copy of the Labor Relations Letter LR-96-01 for your review.

Should you or members of your staff have any questions concerning this *Letter* they may be directed to Headquarters Office of Labor Relations at (202) 708-0370 or in the case of construction projects/program participants to HUD Labor Relations staff at (913) 551-6882/6883/5577.

Sincerely,

Teo las GBC Frank C. Bustamante

Regional Labor Relations Officer

Labor Standards Compliance Requirements

Date: December 2, 1996

(Rev 1) Letter No. LR-96-01

Subject: Labor standards compliance requirements for self-employee laborers and mechanics (aka *Working Subcontractors*)

- I. HUD policy on prevailing wage applicability.
- II. Compliance and certification parameters.
- **III.** Owners of businesses working with their crews.
- IV. Owner-Operators of power equipment.
- V. Truck drivers.

The Federal prevailing wage requirements and compliance standards for self-employed laborers and mechanics (also referred to as "working subcontractors") have long been a confusing and contentious area for the Department of Labor (DOL), HUD, the Internal Revenue Service and contractors and subcontractors.

The following policy represents an effort to provide practical guidance for field application. The guidance more specifically concerns the wage certification requirements for selfemployed mechanics and laborers on projects subject to Federal labor standards provisions including Davis-Bacon and HUD-determined maintenance and nonroutine maintenance prevailing wage rate determinations. This policy does not attempt to establish whether working subcontractors are subject to Federal labor standards nor whether such working subcontractors are *bona fide*. The clear meaning of statutory provisions and regulatory definitions does not require further examination of applicability. Additionally, statutory and regulatory languages are clear that the question of whether certain self-employed laborers and mechanics are bona fide subcontractors is not germane to the issue of prevailing wage standard applicability.

Page 2 Letter No. LR-96-01

I. HUD policy on prevailing wage applicability.

The Davis-Bacon Act (DBA), HUD program Related Acts (DBRA) concerning the payment of prevailing wages as determined by the Secretary of Labor, and the U.S. Housing Act of 1937 concerning the payment of prevailing wage rates established by HUD provide that the wage protections afforded in these statutes apply to laborers and mechanics employed on the covered work. The DBA and DBRA implementing regulations (29 CFR Part 5) specifically stipulate that these protections are provided **regardless of any contractual relationship**

which may be alleged to exist between the contractor and such laborers and mechanics. Additionally, all laborers and mechanics must be paid unconditionally and not less often than once per week. HUD has followed DBA/DBRA prevailing wage parameters in its implementation, administration and enforcement of HUD-determined maintenance and nonroutine maintenance prevailing wage standards. (*NOTE*: The requirement to pay weekly wages is not applicable to the payment of prevailing routine maintenance wage rates related to laborers and mechanics engaged in the operation of PHA and IHA housing developments.)

Therefore, it is HUD policy that in all cases where laborers and mechanics are employed on Federal prevailing wage-covered construction, maintenance and nonroutine maintenance work, laborers and mechanics shall be entitled to compensation (in the case of Davis-Bacon wages, *weekly* compensation) at wage rates not less than the prevailing rate for the type of work they perform **regardless of any contractual relationship alleged to exist between a contractor or subcontractor and such laborers or mechanics**.

The above policy statement is not a departure from previous HUD directives. The guidance presented below establishes uniform HUD-assisted program contract administration and enforcement parameters for labor standards compliance and prevailing wage certification.

II. Compliance and certification parameters.

HUD policy clearly affords prevailing wage protection for all laborers and mechanics, regardless of contractual relationship. There is no exception to this protection for self-employed laborers or mechanics, including owners of businesses, sole-proprietors, partners, corporate officers, or others. This policy in no way precludes or limits any business or individual from participating in HUD-assisted construction, maintenance, or nonroutine maintenance work. The

Page 3 Letter No. LR-96-01

Issue is not one of *eligibility*, whether such persons are permitted to work on HUD-assisted projects, but of compliance standards - what HUD will accept from contractors and subcontractors to demonstrate that proper compliance has been achieved.

In this context, this Letter establishes a HUD administrative policy that laborers and mechanics may not certify to the payment of their **own** prevailing wages **EXCEPT** where the laborer or mechanic is the owner of a business working on the site of the work with his/her own crew. (This exception is described in detail in Paragraph III. Owner-operators of power equipment are discussed in Paragraph IV; Truck drivers are discussed in Paragraph V.)

The most frequent occurrence of self-employed workers on HUD-assisted projects involves mechanic/trade classifications (i.e., not laborer classifications). (For ease of reference, laborers and mechanics in this context are referred to as "mechanics" and include any case involving laborers.) These mechanics may be represented as sole-proprietors, self-employed mechanics, partners, or corporate officers - all with no direct employees engaged in the covered work.

Accordingly, HUD, and program participants responsible for labor standards administration and enforcement (e.g., PHAs, IHAs, CDBG recipients), may not accept certified payrolls

reporting single or multiple owners (e.g., partners) certifying that they have paid to themselves the prevailing wage for their craft. For example, a sole-proprietor may not submit a payroll reporting himself or herself as simply "Owner" signing the certification as to his/her own wage payment from "draws" or other payment methods. Neither may several mechanics submit a payroll reporting themselves as "partners" with one or more certifying as to the payment of their wages or salaries. Such mechanics must instead be carried on the certified payroll of the contractor or subcontractor (the "responsible employer") for whom they are working and with whom they have executed a "contract" for services.

In these cases, maintenance of an accurate accounting of weekly work hours including any overtime hours for such mechanics is essential. Whatever method of compensation computation is utilized (piecework, weekly contract draw for performance), the amount of weekly compensation divided by the actual hours of work performed for that week must result in an "effective" hourly wage rate for that week that is not less than the prevailing hourly rate for the type of work involved. This computation must take into account overtime pay rates (i.e., one and one half) for all hours worked in excess of 40 hours per

Page 4 Letter No. LR-96-01

Week, pursuant to the Contract Work Hours and Safety Standards Act (CWHSSA), where applicable, and pursuant to the Fair Labor Standards Act where CWHSSA is not applicable.

The name, work classification, actual hours of work, effective hourly wage rate, and wage payment for each such mechanic must be reported and certified on the responsible employer's weekly payroll. Note that the effective hourly wage rate for such mechanics may fluctuate from week to week. However, the effective hourly wage rate **may not** be less than the minimum prevailing rate for the respective craft. In any case where the effective rate falls below the corresponding craft prevailing wage rate, the responsible employer must compensate the mechanic at no less than the prevailing rate on the wage determination for that craft.

III. Owners of businesses working with their crew.

Owners of businesses working with their crew on the same HUD-assisted job site may certify to the payment of their own prevailing wages in conjunction with the prevailing wages paid to their employees. This exception to reporting standards *does not* suggest that such owners are not likewise entitled to prevailing wages for their labor. Rather, it accepts the wage payment certification on weekly payroll reports by the owner for his/her own wages as that certification *accompanies* the certification offered for the payment of prevailing wages to his/her employees. Such owners need only list their name, work classification including "owner," and the daily and total hours worked. (Such owners *do not* need to list a rate of pay or amounts earned.)

IV. Owner-operators of power equipment.

Frequently, *owner-operators of power equipment* (e.g., backhoes, front-end loaders) will contract for services at a rate for both "man and machine." In these cases, the owner-operator includes liability, equipment maintenance, and salary in an hourly or contract rate for services. Because of the prevalence of such practice and the inherent difficulty in ascribing costs for liability and maintenance costs versus hourly *labor* salary, HUD and its program clients may accept a combined ("man and machine") hourly rate on the responsible
contractor's certified payroll provided that such hourly rate may not be less than the rate on the wage determination for the respective power equipment operator.

Page 5 Letter No. LR-96-01

Note: Owner-operators of power equipment, like self-employed mechanics, may not submit their own payrolls certifying to the payment of their own wages BUT must be carried on the responsible contractor's certified payroll report.

V. Truck drivers.

As outlined earlier in this Letter, a DOL administrative policy excludes *bona fide owner-operators of trucks who are independent contractors* from DBRA/CWHSSA provisions concerning their own hours of work and rate(s) of pay. These truck "owner-operators" must be reported on weekly payrolls *but* the payrolls do not need to show the hours worked or rates - only the notation "Owner-operator." *Note* that any laborers or mechanics, including truck drivers, employed by the owner-operator/independent contractor are subject to DBRA/CWHSSA provisions in the usual manner.

This policy **does not** pertain to owner-operators of other equipment such as backhoes, bulldozers, cranes and scrapers (i.e., power equipment as noted in paragraph IV, above).

These compliance standards shall take effect immediately. Any exceptions to these standards must be approved in advance in writing by HUD Headquarters Office of Labor Relations.

Any questions concerning this *Letter* may be directed to the Office of Labor Relations at (202)708-0370 or, in the case of HUD program participants, to the HUD Field Labor Relations Staff with jurisdiction for your area.

Visit the Office of Labor Relations on the World Wide Web HUD Home Page

Signage on CDBG Construction Projects

All Community Development Block Grant (CDBG) projects will be required to construct or have constructed a sign which indicates that the project is funded in part or in whole from the Kansas Department of Commerce, Community Development Block Grant program (with the exception of Housing and Urgent Need grants) and the U.S. Department of Housing and Urban Development (HUD) that funds the CDBG program. The following specifications are to be used for this signage:

- 1. Prior to start of construction, secure the services required to provide the layout of the Project Sign to be provided and installed by the Contractor. The sign should be mounted to obtain the maximum public visibility. This is an eligible construction expense, which should be included in the bid specifications.
- 2. Upon completion of the work, the sign should be removed from the premises by the contractor.
- 3. Unless otherwise approved by the project architect or engineer, there should be no other signs or advertising on the job site.
- 4. The following must be included on the signage:
 - a. U.S. Department of Housing and Urban Development
 - b. Community Development Block Grant
 - c. Kansas Department of Commerce and grant amount
 - d. Name of Grantee and project number
 - e. Name of City/County Officials
 - f. Name of Consultants: grant administrator, architect, engineer
 - g. Name of Contractor(s) and Subcontractors, if applicable.
- 5. A proposed layout and sample are attached hereto. Maximum cost of sign should be no more than \$500. Any cost above \$500 is not CDBG eligible.

SAMPLE

City of Urban

U.S. Department of Housing and Urban Development Community Development Block Grant PROJECT # 17-PF-120 Kansas Department of Commerce \$400,000

CITY OFFICIALS:

Mayor John Doe Council Member Jane Smith Council Member Jim Jones

ARCHITECT:

Everyone, P.A. Anywhere, Anyplace, KS

ENGINEERS:

Busyone Company Anywhere, Anyplace, KS

GRANT ADMINISTRATOR:

Joe Jones Anywhere, Anyplace, KS **CONTRACTOR:**

Anyone Construction, Inc. Anywhere, Anyplace, KS

PLUMBING:

No One & Sons, Inc. Anywhere, Anyplace, KS

ELECTRICIAN:

Someone's Services, Inc. Anywhere, Anyplace, KS

HVAC:

Workingone Company Anywhere, Anyplace, KS

Grantee Handbook

Certification Regarding Government-Wide Restriction on Lobbying (For Contracts Over \$100,000)

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

- 1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- 3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, cooperative agreements) over \$100,000, and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Date

Principal

SUMMARY OF CIVIL RIGHTS LAWS, EXECUTIVE ORDERS, AND REGULATIONS

CDBG grantees must ensure all project activities will be administered in compliance with all civil rights laws and regulations. The following are summaries of those parts of the civil rights laws and regulations applicable to CDBG activities.

Title VI of the Civil Rights Act of 1964 provides that no person in the United States shall, on the grounds of race, color or national origin, be excluded from participation in, be denied benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

Title VIII of the Civil Rights Act of 1968 (Fair Housing Act), as amended, prohibits discrimination in the sale, rental and financing of dwellings based on race, color, religion, sex or national origin. Title VIII was amended in 1988 (effective March 12, 1989) by the Fair Housing Amendments Act, which: expanded the coverage of the Fair Housing Act to prohibit discrimination based on disability or on familial status (presence of child under age of 18, and pregnant women); established new administrative enforcement mechanisms with HUD attorneys bringing actions before administrative law judges on behalf of victims of housing discrimination; and revised and expanded Justice Department jurisdiction to bring suit on behalf of victims in Federal district courts.

Section 109, Housing and Community Development (HCD) Act of 1974, as amended, provides that no person in the United States shall, on the grounds of race, color, national origin, religion, or sex, be excluded from participation in, be denied the benefits of or be subjected to discrimination under any program or activity funded in whole or in part with funds made available under Title I of the Housing and Community Development Act of 1974.

Section 504 of the Rehabilitation Act of 1973, as amended, provides for nondiscrimination of an otherwise qualified individual solely on the basis of his/her handicap in benefiting from any program or activity receiving federal financial assistance. All recipients must certify to compliance with all provisions of this Section.

Age Discrimination Act of 1975. No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of or subjected to discrimination under, any program or activity receiving federal financial assistance.

Executive Order 11063, as amended, directs all departments and agencies to take all action necessary and appropriate to prevent discrimination in housing and related facilities owned or operated by the federal government or provided with federal financial assistance and in the lending practices with respect to residential property and related facilities (including land to be developed for residential use) of lending institutions, insofar as such practices relate to loans insured or guaranteed by the federal government.

Kansas Act Against Discrimination. It is a policy of the State of Kansas that requires all employers, labor organizations, employment agencies, realtors, financial institutions, or other persons covered by this Act to assure equal opportunities and encourage every citizen regardless of

race, religion, color, sex, age, physical disability, national origin, or ancestry, to secure and hold – without discrimination, segregation, or separation – employment in any field of work or labor for which they are properly qualified, the opportunity for full and equal public accommodations, and to assure full and equal opportunities in housing.

Section 3 of the Housing and Urban Development Act of 1968, as amended, provides that, to the greatest extent feasible, opportunities for training and employment shall be given to recipients of public housing and lower income residents of the unit of local government or the metropolitan area (or non-metropolitan county) in which the project is located, contract work in connection with such projects shall be awarded to business concerns which are owned in substantial part by persons residents in full-time positions, or subcontract with businesses which provide economic opportunities to lower income persons.

Executive Order 11246, as amended, provides that no person shall be discriminated against on the basis of race, color, religion, sex or national origin in any phase of employment during the performance of federal or federally-assisted construction contracts in excess of \$10,000. The following civil rights requirements also apply to CDBG grantee performance: grantees shall comply with Executive Order 11246, as amended by Executive Order 12086, and the regulations issued pursuant thereto (41 CFR Chapter 60) which provide that no person shall be discriminated against on the basis of race, color, religion, sex, sexual orientation, gender identity or national origin in all phases of employment during the performance of federal or federally-assisted construction contracts. As specified in Executive Order 11246 and the implementing regulations, contractors and subcontractors on federal or federally assisted construction contracts shall take affirmative action to ensure fair treatment in employment, upgrading, demotion or transfer, recruitment or retirement advertising, layoff or termination, rates of pay or other forms of compensation and selection or training and apprenticeship.

Section 503 of the Rehabilitation Act of 1973, as amended, provides for the nondiscrimination in contractor employment. All recipients of federal funds must certify to the following through all contracts issued:

Affirmative Action for Handicapped Workers

- 1. The contractor will not discriminate against any employee in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to make affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: Employment upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeships.
- 2. The contractor agrees to comply with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.
- 3. In the event of the contractor's noncompliance with the requirements of this clause, action for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

- 4. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in the form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment and the rights of applicants and employees.
- 5. The contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.
- 6. The contractor will include the provisions of this clause in every subcontract or purchase order of \$2,500 or more unless exempted by rules, regulations or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontractor or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

Section 912 of the Cranston-Gonzales National Affordable Housing Act, as amended, Section 109 (a) of the HCD Act to prohibit discrimination on the basis of religion.

E-Verify - CFR 52.222-54 requires federal contracts committing government contractors (subcontractors) to use the USCIS E-Verify system to verify that all of the contractors employees, (existing and new), directly performing work under federal contracts, are authorized to work in the United States.

Appendix P

Certification of Understanding and Payroll Authorization

Project Location:			
Company Name:			
Address:			
City:	State:	Zip Code:	

This is to certify that the principle(s), and the authorized payroll office listed below, have read the "Contractor's Guide to Prevailing Wage Requirements for Federally Assisted Construction" and the Federal Labor Standards Provisions (HUD-4010 form) and that both parties understand these requirements.

The following person is designated as the payroll officer for the company and is authorized to sign the Statement of Compliance that will accompany each weekly Certified Payroll Report for the project:

PAYROLL OFFICER: (Individual responsible for signing Statements of Compliance)

Name	Title
Signature	Date
PRINCIPLE OWNER/GENERAL PARTNER:	(Listed on CSLB Personnel List)
Name	Title

Signature

Date

Project No. 22-3225RE

INVITATION TO BID

Sealed Bids, will be received by Tristen Cope, Hillsboro Community Child Care Center (H4C), Hillsboro, Kansas, for the furnishing of all labor and materials as hereinafter specified for the construction of Hillsboro Community Child Care Center. **Bids shall be delivered to the City Hall – Council Meeting Room located at 118 E. Grand, Hillsboro, Kansas**, <u>before **Wednesday**, **April 10, 2024 at 2:00 p.m.</u>** Bids received after this time will not be accepted. Bids will be opened in private session with the owner the same day.</u>

1. PROJECT SCOPE

- a. Building Rehabilitation: 11,839 s.f. Existing First Floor
- b. Footing/Found: Concrete footings and foundations, Existing full basement.
- c. Floor Structure: Cast-in-place concrete structural slab
- d. Wall/Roof Structure: CMU exterior walls; Interior wood framing, Wood trusses, Wood Deck, and Insulated panels.
- e. Exterior Finishes: Existing masonry/brick.
- f. Floor Finishes: LVT resilient flooring, Cushioned play floor, Epoxy Resin kitchen floor, Entry carpet.
- g. Ceiling Finishes: Painted or Finished Gyp, Acoustic Ceilings, exposed structure.
- h. Custom Cabinetry: Plastic Laminate, Stain & Finished wood. Solid Surface Countertops
- i. Wall Finishes: Painted Gypsum Board.
- j. Roof Membrane: Asphalt Shingle; New architectural metal roof at new entrance.
- k. Paving: Concrete paving sidewalk and driveway.
- 1. Kitchen Equipment: New Commercial Kitchen Equipment.
- m. Sprinkler system. Building is to be fully sprinkled.
- n. Mechanical: New VRF HVAC system with ground mounted equipment. Make-up air unit for kitchen. Existing chiller system to be removed.
 - Exhaust fans for restroom exhaust.
- o. Plumbing:
 - Waste, Vent Piping, equipment, and plumbing fixtures.
 - Domestic water, equipment, and fixtures.
 - Electric water heaters.
 - Water softener system.
 - Flush valve water closets and urinals.
- o. Electrical:
 - New Overhead Electrical Service.
 - New Lighting and site lighting.
 - Fire alarm system.
 - Conduit & cabling for owner's data systems.
- p. Site Utilities:

Existing domestic water system. New Fire Service water line. Tie in of new sewer to existing sewer line through site.

2. PRE-BID CONFERENCE

Pre-Bid Conference will be held on <u>Tuesday</u>, <u>April 2, 2024</u> at 2:00 p.m. at building site, 211 Elm St, Hillsboro, KS. Failure to attend may be grounds for rejection of bid.

3. COMPLETION TIME

Completion date for the project is to be bid in calendar days: To be Bid by Contractor and stated on the Bid Form.

4. The GENERAL CONSTRUCTION CONTRACT will include General Construction, Mechanical, and Electrical Work combined into one Contract.

- 5. As a condition precedent to Contract Award, type of work completed and proposed Subcontractors will be carefully considered. Owner is not obligated to accept lowest or any other bid.
- 6. This Project is Subject to Federal Davis-Bacon Wage Rates. See information and forms contained in the Specifications. Contractor is responsible for all record keeping and presenting final documentation to the Government, Grant Agency, and Owner.
- 6. This Project is part of a Community Development Block Grant. See information and forms contained in the Specifications. Contractor is responsible for all requirements of the Grant, all record keeping, and presenting final documentation to the Government, Grant Agency, and Owner.
- The Drawings, Specifications, and Contract Documents may be obtained by bona fide Prime Bidders (Mechanical and Electrical, and Subcontractors) from Jones Gillam Renz Architect, 730 North 9th Street, Salina, Kansas 67401, 785-827-0386 upon deposit of <u>\$250.00</u> for one (1) set of General Construction, Mechanical and Electrical Drawings and Specifications.

Electronic Drawings and specifications will be available for review on the website at www.jgrarchitects.com. Mechanical, Plumbing and Electrical Subcontractors who are bidding from documents via website or plan room must contact the office of Jones Gillam Renz Architects, 785.827.0386 to register as an official Plan Holder.

Those who submit prime bids may obtain refund by returning sets in good condition no more than one (1) week after bids have been opened. No refund of deposit will be made to Contractors not submitting a bid, unless all documents are returned in good condition five (5) days prior to time of receiving bids.

CONTRACT DOCUMENTS will be on file and may be examined at the following locations: Jones Gillam Renz Architects, 730 North 9th Street, Salina, KS 67401, ph. 785-827-0386, <u>www.jgrarchitects.com</u> Associated General Contractors of Kansas, ph. 316-928-8635, <u>www.agcks.org</u> KCNR, LLC., ph. 316-263-0265, <u>https://kenr.net</u> Dodge Construction Network, ph. 877-784-9556, <u>www.construction.com</u> Construct Connect, ph. 877-969-2909, <u>www.cmdgroup.com</u> Salina Blueprint, 209 S. Santa Fe Ave., Salina, KS 67401, ph. 785-827-6182, <u>www.salinablue.com</u> Hillsboro City Hall, 118 East Grand, Hillsboro, KS ph. 620 947-3162

8. BID SECURITY in the amount of 5% of the bid must accompany each bid in accordance with INFORMATION FOR BIDDERS.

BY ORDER OF:

Hillsboro Community Child Care Center (H2C) Hillsboro, Kansas



1815 South Eisenhower Street Wichita, Kansas 67209 P (316) 262-0171 F (316) 262-6997 Terracon.com

Asbestos and Lead Containing Paint Inspection

Trinity Mennonite Church Brownfields Targeted Assessment 211 South Elm Street

Hillsboro, Marion County, Kansas 67063

November 17, 2022 Terracon Project No. 01227204

KDHE Project Code C5-057-73842



Prepared for: KDHE Bureau of Environmental Remediation Topeka, Kansas

Prepared by:

Terracon Consultants, Inc. Wichita, Kansas





November 17, 2022

KDHE Bureau of Environmental Remediation 1000 SW Jackson St. Ste 410 Topeka, KS 66612-1367

- Attn: Mr. Seth Mettling, Brownfields Coordinator P: (785) 296-5519 E: <u>seth.mettling@ks.gov</u>
- Re: Asbestos and Lead Containing Paint Inspection Trinity Mennonite Church Brownfields Targeted Assessment 211 South Elm Street Hillsboro, Marion County, Kansas 67063 Terracon Project No: 01227204 KDHE Project Code C5-057-73842

Dear Mr. Mettling:

Terracon Consultants, Inc. (Terracon) is pleased to submit the attached report for the above referenced site to the KDHE Bureau of Environmental Remediation. The purpose of this report is to present the results of an asbestos and lead containing paint inspection conducted on September 28, 2022 and October 18, 2022. This survey was conducted in general accordance with our Environmental Services Contract with KDHE.

Asbestos was identified at a concentration greater than one percent in samples collected from the following materials:

Material	Material Location	NESHAP	Estimated
Description		Category	Quantity
9" x 9" Grey Floor Tile	1 st floor kitchen and north hallway	Category I Nonfriable	1,000 square feet
12" x 12" Pebble	Basement Kitchen	Category I,	200 square
Pattern Floor Tile		Nonfriable	feet
Mudded Joint Fittings	Basement Boiler Room and Cold Domestic Water Lines and Hot Water Recirculation Lines	RACM	20 fittings*

*= Additional fittings are likely to exist in the floor joist system for these systems and hidden from site.

Asbestos was identified at a concentration of less than one percent in samples collected from the following materials:

Material Description	Material Location
Gypsum Wallboard System	Throughout Facility

319 Leonard Street | Onaga, Kansas



November 17,2022 | Terracon Report No. 01227204

Material Description	Material Location
Exterior Window Glazing	Windows

Lead based paint (LBP) as defined by the United States Environmental Protection Agency (USEPA), and the State of Kansas, was not identified in the samples analyzed on site via X-Ray Fluorescence Device or through confirmatory laboratory paint chip analysis.

Lead containing paint as defined by the United States Occupational Safety and Health Administration (USOSHA) were identified via X-Ray Fluorescence device analysis on site:

Location	Unit	Substrate	Color	Reading
1 st Floor	Wall	Drywall	Yellow	0.20
Nursery				
Basement	Door	Metal	White	0.14
Utility Room				
Basement SE	Ceiling	Concrete	White	0.02
Header				
Basement	Heat Register	Metal	Brown	0.09
Storage Off				
Kitchen				
Exterior	Eave SE	Wood	White	0.89
Exterior	Gutter SE	Metal	White	0.01
Exterior	Downspout SE	Metal	White	0.29

Please refer to attached report for detailed information.

Terracon appreciates the opportunity to provide this service to the KDHE Bureau of Environmental Remediation. If you have any questions regarding this report, please contact the undersigned at (316) 262-0171.

Sincerely, **Terracon Consultants, Inc.** *Prepared by:*

Jam E. Qamet

James E. Aamodt, P.E. Project Engineer

Reviewed by:

William L. Wright Project Manager



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APPENDICES

APPENDIX A-1 - IDENTIFIED ASBESTOS CONTAINING MATERIALS BY HOMOGENEOUS AREA APPENDIX A-2 – IDENTIFIED BUILDING MATERIALS CONTAINING LESS THAN 1% ASBESTOS

- APPENDIX B ASBESTOS SAMPLE LOCATION SUMMARY
- APPENDIX C LEAD PAINT SCREENING DATA
- APPENDIX D LABORATORY ANALYTICAL REPORTS
- APPENDIX E LICENSES AND CERTIFICATIONS
- APPENDIX F PHOTOS



ASBESTOS AND LEAD CONTAINING PAINT INSPECTION Trinity Mennonite Church 211 South Elm Street Hillsboro, Marion County, Kansas Terracon Project No. 01227204 KDHE Project Code C5-057-73842 November 17, 2022

1.0 INTRODUCTION

Terracon Consultants Inc. (Terracon) conducted an asbestos and lead paint inspection of the Trinity Mennonite Church locate at 211 South Elm Street in Hillsboro, Marion County, Kansas. The inspection was conducted by an Asbestos Hazard Emergency Response Act (AHERA) accredited asbestos inspector and a State of Kansas certified Lead Risk Assessor in general accordance with our Environmental Services Contract with KDHE. Building areas were visually assessed for suspect asbestos-containing materials (ACM) and suspect lead paint. Reasonable effort was made to survey accessible areas. Additional suspect materials could be present in walls, in voids or in other concealed areas.

1.1 Reliance

This report is for the exclusive use of the KDHE Bureau of Environmental Remediation for the project being discussed. Reliance by any other party on this report is prohibited without written authorization of Terracon and the KDHE Bureau of Environmental Remediation. Reliance on this report by the KDHE Bureau of Environmental Remediation and all authorized parties will be subject to the terms, conditions, and limitations stated in the proposal, this report and our Agreement for Services. The limitations of liability defined in our Agreement for Services is the aggregate limit of Terracon's liability to the KDHE Bureau of Environmental Remediation.

2.0 BUILDING DESCRIPTION

The subject Trinity Mennonite Church is located at 211 S. Elm St. in Hillsboro, Marion County, Kansas. At the time of the site visit, the subject space was vacant and consisted of an approximately 11,377 square foot building that is single-story, slab-on-grade and over-basement, wood-framing, interior drywall with drop ceiling, and exterior brick veneer. General interior materials consist of finished drywall, ceramic floor and wall tiles, carpet, and a suspended ceiling system. Information provided by the City of Hillsboro indicated that the basement was not scheduled for renovation.

3.0 ASBESTOS-CONTAINING MATERIAL SURVEY

The survey was conducted by James Aamodt and William Wright, United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) accredited asbestos inspectors. The asbestos inspectors' certification is attached in Appendix E. The survey was conducted in general accordance with the sample collection protocols established in U.S. Environmental Protection Agency (EPA)



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40 CFR Part 763 Subpart E 763.86, known as the AHERA. A summary of survey activities is provided below.

3.1 Visual Assessment

Survey activities were initiated with visual observation of the building to identify homogeneous areas of suspect ACM. A homogeneous area (HA) consists of building materials that appear similar throughout in terms of color and texture with consideration given to the date of application. The interior and exterior assessment was conducted in visually accessible areas of the building.

3.2 Physical Assessment

A physical assessment of each homogeneous area (HA) of suspect ACM was conducted to assess the friability and condition of the materials. A friable material is defined by the EPA as a material that can be crumbled, pulverized or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

3.3 Sample Collection

Based on results of the visual observation, bulk samples of suspect ACM were collected in general accordance with EPA AHERA sampling protocols. Samples of suspect materials were collected from randomly selected locations in each homogeneous area. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker. The selection of sample locations and frequency of sampling were based on Terracon's observations and the assumption that like materials in the same area are homogeneous in content.

3.4 Sample Analysis

Bulk samples were submitted under chain of custody to EMSL Analytical, Inc. (EMSL) of Saint Louis, Missouri for analysis by Polarized Light Microscopy (PLM) with dispersion staining techniques per USEPA Method 600/R-93/116. The asbestos content, where applicable, was determined by microscopic visual estimation. EMSL is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) Accreditation No. 200742-0.

3.5 Regulatory Overview

The Kansas Department of Health and Environment's, (KDHE) Asbestos Control Section within the Bureau of Air and Radiation, enforces the Asbestos NESAHP as adopted by reference at Kansas Administrative Regulations (K.A.R.) 28-19-735. The owner or operator must provide KDHE with written notification at least 10 working days prior to the commencement of asbestos abatement activities that will disturb RACM in amounts greater than or equal to 10 square feet or 25 linear feet.

The asbestos NESHAP (40 CFR Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. The asbestos NESHAP regulation also requires the identification and classification of existing ACM according to friability prior to demolition or renovation activity. Friable ACM is a material

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Ferracon

containing more than 1% asbestos that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure. All friable ACM is considered regulated asbestos containing material (RACM).

The asbestos NESHAP regulation classifies ACM as either RACM, Category I non-friable ACM or Category II non-friable ACM. RACM includes all friable ACM, along with Category I and Category II non-friable ACM that has become friable, will be or has been subjected to sanding, grinding, cutting or abrading, or ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder during renovation or demolition activity. Category I non-friable ACM are exclusively asbestos-containing packings, gaskets, resilient floor coverings, resilient floor covering mastics and asphalt roofing products that contain more than 1% asbestos. Category II non-friable ACM are all other non-friable materials other than Category I non-friable ACM that contain more than 1% asbestos. Category II non-friable ACM are secled to see the product of the panels, glazing, mortar and grouts.

The United States Occupational Safety and Health Administration (USOSHA) asbestos standard for construction (29 CFR 1926.1101) regulates workplace exposure to asbestos. The USOSHA standard requires that employee exposure to airborne asbestos must not exceed 0.1 fibers per cubic centimeter of air (0.1 f/cc) as an eight-hour time weighted average (TWA) and not exceed 1.0 fibers per cubic centimeter of air (1.0 f/cc) over a 30-minute period known as an excursion limit (EL). The TWA and EL are known as USOSHA's asbestos permissible exposure limits (PELs). The USOSHA standard classifies construction and maintenance activities which could disturb ACM and specifies work practices and precautions which employers must follow when engaging in each class of regulated work. The standard also establishes requirements for handling materials containing asbestos in concentrations less than or equal to one percent.

3.6 Findings

Asbestos was identified at a concentration greater than one percent in samples collected from the following materials.

Material	Material Location	NESHAP	Estimated
Description		Category	Quantity
9" x 9" Grey Floor Tile	1 st floor kitchen and north hallway	Category I Nonfriable	1,000 square feet
12" x 12" Pebble	Basement Kitchen	Category I,	200 square
Pattern Floor Tile		Nonfriable	feet
Mudded Joint Fittings	Basement Boiler Room and Cold Domestic Water Lines and Hot Water Recirculation Lines	RACM	20 fittings*

*= Additional fittings are likely to exist in the floor joist system for these systems and hidden from site.

RACM – Regulated Asbestos Containing Materials

The above listed RACM must be removed by a state of Kansas licensed abatement contractor prior to any activities (renovation and/or demolition) that may disturb this material in accordance with applicable federal, state and local regulations.

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The above listed Category I non-friable ACM that is damaged or could be damaged to the extent that it could be crumbled, pulverized or reduced to powder when dry, making it friable, must be removed prior to any activities (renovation and/or demolition) that may disturb this material in accordance with applicable federal, state and local regulations.

Identified Asbestos Containing Materials by Homogenous Area are presented in Appendix A-1. Identified Building Materials Containing Less Than 1% Asbestos are presented in Appendix A-2.

The summary of sample locations is presented in Appendix B.

Laboratory analytical reports are included in Appendix D.

4.0 LEAD PAINT SURVEY

William Wright, a State of Kansas certified Lead Risk Assessor, conducted lead paint testing. Terracon conducted X-Ray Fluorescent (XRF) testing on-site utilizing and Innov-X alpha series unit and collected representative confirmatory paint chip samples from representative lead containing building surfaces. The lead risk assessor certification is included in Appendix E.

4.1 Visual Assessment

The lead-based paint inspection began by visually surveying accessible building components such as walls, ceilings, floors, doors and windows. Various colors of paint were found on interior and exterior surfaces. These components have the potential to be disturbed during renovation activities.

4.2 Sample Collection

A total of 40 XRF readings, not including 13 calibration and standardization reading, and 3 paint chip samples were collected from representative building surfaces. Paint chip samples were sent by chain of custody to an accredited laboratory for analysis. Lead concentrations in paint chips are measured in parts per million or percent by weight. Paint chips samples were collected in general accordance with USEPA guidance "*Paint Chip Sample Collection Guide*, Lead Renovation, Repair and Painting Program – October 2011".

4.3 Sample Analysis

Paint chip samples were submitted under chain of custody EMSL of Saint Louis, Missouri, for analysis by United States Environmental Protection Agency (USEPA) methodology 7000B (1). QuanTEM Laboratories is accredited by the American Industrial Hygiene Association (AIHA) Lead Accreditation Program (LAP) accreditation No. 101352. Lead content in samples were reported in percent (%) by weight.

4.4 Lead Paint Regulatory Overview

The USEPA and the KDHE currently regulate Lead Based Paint, paint containing a lead content of 1.0 mg/cm² or 0.5% or greater of lead by weight, in "child occupied" and "targeted housing". There are

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currently no USEPA or KDHE regulations regarding commercial/industrial facilities. The USEPA and KDHE do regulate the disposal of lead containing materials but only if the lead paint has been abated and is specifically disposed of as lead paint. General renovation debris and demolition debris can currently be disposed of as Construction and Demolition (C&D) debris in the State of Kansas as long as the landfill accepts these materials.

The USOSHA 29 CFR 1926.62 has established permissible limits for airborne lead concentrations in the workplace. Owners or employers conducting renovation or demolition activities which may disturb building materials containing lead (in any concentration) are required to protect their employees from airborne lead exposures exceeding the USOSHA permissible exposure limit (PEL).

USOSHA has established an "Action Level" for lead concentrations "in air" of 30 micrograms per cubic meter of air (μ g/m³) and a "Permissible Exposure Limit" for lead concentrations "in air" of 50 μ g/m³. Currently USOSHA has no established limits for lead content in bulk paint (non-airborne). Their interpretation on this issue is that any amount of lead may cause airborne concentrations above the established limits.

4.5 Findings

Lead based paint (LBP) is defined by the USEPA and the State of Kansas as any paint or surface coating that contains 0.5% or greater of lead by weight in "child occupied" and "targeted housing" and the USOSHA has indicated that owners or employers conducting renovation or demolition activities which may disturb building materials containing lead (in any concentration) are required to protect their employees from airborne lead exposures exceeding the USOSHA PEL.

Lead based paint (LBP) as defined by the United States Environmental Protection Agency (USEPA), and the State of Kansas, was not identified in the samples analyzed on site via XRF or through confirmatory laboratory paint chip analysis.

Lead containing paint as defined by the United States Occupational Safety and Health Administration (USOSHA) were identified via X-Ray Fluorescence device analysis on site:

Location	Unit	Substrate	Color	Reading
1 st Floor	Wall	Drywall	Yellow	0.20
Nursery				
Basement	Door	Metal	White	0.14
Utility Room				
Basement SE	Ceiling	Concrete	White	0.02
Header				
Basement	Heat Register	Metal	Brown	0.09
Storage Off				
Kitchen				
Exterior	Eave SE	Wood	White	0.89
Exterior	Gutter SE	Metal	White	0.01
Exterior	Downspout SE	Metal	White	0.29

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Appendix D includes Lead Paint Laboratory Analytical Data.

The USOSHA hazard communication requirement states that when hazardous materials (lead, asbestos, etc.) are present, employers who have employees that may disturb the hazardous materials, employers must inform their employees of the presence of such materials.

While the painted surfaces containing lead in concentrations between the laboratory's limit of detection (<.005%) and 0.5% of lead by weight do not meet the definition of lead-based paint under the USEPA or the State of Kansas, the paint does contain lead and is subject to regulation under USOSHA. Results below the limit of detection may also contain lead and could also be subject to the USOSHA regulation. Therefore, it is the contractor's responsibility to make appropriate decisions concerning compliance with applicable USOSHA regulations.

5.0 GENERAL COMMENTS

Terracon did not perform sampling that required demolition or destructive activities such as knocking holes in walls, dismantling of equipment or removal of protective coverings. Reasonable efforts to access suspect materials within known areas of restricted access (e.g., crawl spaces) were made; however, confined spaces or areas which may pose a health or safety risk to Terracon personnel were not sampled. Sampling did not include suspect materials that could not be safely reached with available ladders/man-lifts. Terracon did not sample suspect materials that may be present in movable equipment such as freezers, kitchen equipment and hoods. Terracon typically investigated for flooring beneath carpeting by lifting small corner sections of carpet. If tiles were seen, they have been identified in the report. If tiles were not seen at corners under the carpet, it does not imply that there are no tiles beneath the carpeted floor. Terracon did not conduct destructive investigation of doors in the building to determine if the doors were insulated for fire-rating purposes.

This survey was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions and recommendations expressed in this report are based on conditions observed during Terracon's survey of the building. The information contained in this report is relevant to the date on which this survey was performed and should not be relied upon to represent conditions at a later date. This report, prepared on behalf of and exclusively for use by the KDHE Bureau of Environmental Remediation, is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information that may have been used in the preparation of this report. No warranty, express or implied is made.



APPENDIX A-1 Trinity Mennonite Church BTA 211 South Elm Street Hillsboro, Marion County, Kansas Terracon Project No. 01227204 November 17, 2022

IDENTIFIED ASBESTOS CONTAINING MATERIALS BY HOMOGENEOUS AREA (HA)

HA No.	Material Description	Material Location	NESHAP Category	Percent and Type of Asbestos	Estimated Quantity
05	9" x 9" Grey Floor Tile	1^{st} floor kitchen and north hallway	Category I Nonfriable	3% Chrysotile	1,000 square feet
07	12" x 12" Pebble Pattern Floor Tile	Basement Kitchen	Category I, Nonfriable	3% to 4% Chrysotile	200 square feet
08	Mudded Joint Fittings	Basement Boiler Room and Cold Domestic Water Lines and Hot Water Recirculation Lines	RACM	4% to 5% Chrysotile	20 fittings*
*= Additional fittings are likely to exist in the floor joist system for these systems and hidden from site.					

RACM= Regulated Asbestos Containing Material

Percent & Type Asbestos = this column contains both the analytical result of the sample with the highest concentration of asbestos detected in the samples that make up the HA and the types of asbestos identified.

Estimated quantities are based on a cursory field evaluation, and actual quantities may vary significantly, especially if asbestos containing materials are present in hidden and/or inaccessible areas not evaluated as part of this survey.

PC-indicates that stratified point count method of analysis was performed.



APPENDIX A-2 Trinity Mennonite Church BTA 211 South Elm Street Hillsboro, Marion County, Kansas Terracon Project No. 01227204 November 17, 2022

IDENTIFIED BUILDING MATERIALS CONTAINING LESS THAN 1% ASBESTOS

Material Description	Material Location	Percent and Type of Asbestos
Gypsum Wallboard System	Throughout Facility	<1% Chrysotile as Composite Sample (3% Chrysotile Joint Compound)
Exterior Window Glazing	Windows	0.50% Chrysotile via Point Count



APPENDIX B Trinity Mennonite Church BTA 211 South Elm Street Hillsboro, Marion County, Kansas Terracon Project No. 01227204 November 17, 2022

ASBESTOS SURVEY SAMPLE LOCATION SUMMARY

HA #	Sample #	Material Description	Sample Location (also see App. E drawings)	HA Location(s)	Results (Percent/Type of Asbestos)
	01-CT4-01	2'v4' Ceiling	Multi-Purpose Room		None Detected (ND)
01	01-CT4-02	Tile with	Library	Building (Main	ND
01	01-CT4-03	Small Hole Pattern	N-S Corridor	Basement)	ND
	01-CT4-22		Basement		ND
	02-CT4-04	- 2'x4' Ceiling Tile with Large Hole	Pastor's Office		ND
0.2	02-CT4-05		Men's Restroom	Building (Main	ND
02	02-CT4-06		N. E-W Corridor	Basement)	ND
	02-CT4-23	Pattern	Basement		ND
	03-WB1-07	Cupsum/	Library		<1% Chrysotile (Composite Sample)
0.2	03-WB1-08	Tape/	Multi-Purpose Room	Building (Main	<1% Chrysotile (Composite Sample)
03	03-WB1-09	Joint	Nursery	Basement)	<1% Chrysotile (Composite Sample)
	03-WB1-24 Compound	Compound	Basement		<1% Chrysotile (Composite Sample)
04	04-MG3-10		Multi-Purpose Room		ND



ASBESTOS SURVEY SAMPLE LOCATION SUMMARY

HA #	Sample #	Material Description	Sample Location (also see App. E drawings)	HA Location(s)	Results (Percent/Type of Asbestos)
	04-MG3-11		Restroom off N. E-W Corridor	Building (Main	ND
	04-MG3-12	Cove Base and Mastic	Chapel	Floor and	ND
	03-WB1-24		Basement	Basement)	<1% Chrysotile
	05-FT3-13		Kitchen		3% Chrysotile
05	05-FT3-14	9"x9" Floor Tile	Kitchen	Building (Main Floor)	3% Chrysotile
	05-FT3-15	The second	N. E-W Corridor	i loory	3% Chrysotile
	06-MA4-16	4″x4″	Women's Restroom		ND
06	06-MA4-17	Ceramic Tile	Women's Restroom	Building (Main Floor)	ND
	06-MA4-18	Grout	Women's Restroom	i loory	ND
	07-MA4-19	1″x1″ Ceramic Tile Grout	Kitchen		ND
07	07-MA4-20		Men's Restroom	Building (Main Floor)	ND
	07-MA4-21		Men's Restroom		ND
	07-FT2-26		Basement Kitchen	Building (Basement)	4% Chrysotile
07b	07-FT2-27	12"x12" Pebble VFT	Basement Kitchen		3% Chrysotile
	07-FT2-28		Basement Kitchen		3% Chrysotile
	07-FT2-26	12″x12″	Basement Kitchen		ND
07b	07-FT2-27	Pebble VFT	Basement Kitchen	Building (Basement)	ND
	07-FT2-28	Adhesive	Basement Kitchen	(Busement)	ND
	08-MJ4-29	Mudded loint	Fitting - Cold Water West Wall	Building	5% Chrysotile
08b	08-MJ4-30	Fitting	Fitting – Recirc Cold Domestic	(Basement)	4% Chrysotile
	08-MJ4-31		Fitting – Domestic Water 1.5"		5% Chrysotile
	09-PI4-32		Piping – Cold Water – W. Wall	5	ND
09b	09-PI4-33	Pipe Insulation	Piping Recirc Cold Domestic	Building (Basement)	ND
	09-PI4-34		Piping Domestic Water 1.5"	(Duschienc)	ND



ASBESTOS SURVEY SAMPLE LOCATION SUMMARY

HA #	Sample #	Material Description	Sample Location (also see App. E drawings)	HA Location(s)	Results (Percent/Type of Asbestos)
	10-CA5-35		Window Glazing SE		<1% Chrysotile (0.50% Point Count)
10b 10-C	10-CA5-36	Window Glazing	Window Glazing – Sanctuary E.	Building Exterior	<1% Chrysotile (0.50% Point Count)
	10-CA5-37		Window Glazing – Sanctuary W.		<1% Chrysotile (0.50% Point Count)

Bold – Asbestos containing material



APPENDIX C Trinity Mennonite Church BTA 211 South Elm Street Hillsboro, Marion County, Kansas Terracon Project No. 01227204 November 17, 2022

Date	Location	Unit	Substrate	Color	Reading
9/28/2022	Standardization				
9/28/2022	Calibration			red	1.28
9/28/2022	Calibration			red	1.13
9/28/2022	Multi Purpose Room	wall	drywall	yellow	0.00
9/28/2022	Room Off Chapel	wall	drywall	yellow	0.00
9/28/2022	Kitchen	wall	drywall	yellow	0.00
9/28/2022	Library	wall	drywall	white	0.00
9/28/2022	Pastors Office	wall	drywall	brown	0.00
9/28/2022	Nursery	wall	drywall	green	0.20
9/28/2022	Chapel	wall	CMU	white	0.00
9/28/2022	Chapel	register	metal	brown	0.00
10/18/2022	Standardization				
10/18/2022	Calibration			red	1.11
10/18/2022	Calibration			red	1.12
10/18/2022	Calibration			red	1.08



Date	Location	Unit	Substrate	Color	Reading
10/18/2022	Basement Stairwell N Wall	wall	concrete	white	0.00
10/18/2022	Basement Tornado Shelter	wall	drywall	blue	0.00
10/18/2022	Basement Tornado Shelter	heat register	metal	brown	0.00
10/18/2022	Basement Utility Room	door	metal	white	0.14
10/18/2022	Basement Utility Room	door frame	metal	white	0.00
10/18/2022	Basement Room 7	east wall	concrete	tan	0.00
10/18/2022	Basement Room 7	south wall	drywall	pink	0.00
10/18/2022	Basement Room 7	north wall	drywall	blue	0.00
10/18/2022	Basement Room 8	door frame	metal	beige	0.00
10/18/2022	Basement Room 5	heat register	metal	gray	0.00
10/18/2022	Basement Room 4	east wall	drywall	purple	0.00
10/18/2022	Basement Room 4	east wall	drywall	orange	0.00



Date	Location	Unit	Substrate	Color	Reading
10/18/2022	Basement Room 4	east wall	drywall	green	0.00
10/18/2022	Basement Hallway	SW wall	concrete	beige	0.00
10/18/2022	Basement SE Exit	header	concrete	white	0.02
10/18/2022	Basement SW Stairwell	wall	concrete	white	0.00
10/18/2022	Basement SW Stairwell	wall	CMU	white	0.00
10/18/2022	Basement North Wall	north wall	concrete	beige	0.00
10/18/2022	Basement Kitchen	wall	drywall	green	0.00
10/18/2022	Basement Kitchen	wall	concrete	white	0.00
10/18/2022	Basement Storage Off Kitchen	south wall	drywall	yellow	0.00
10/18/2022	Basement Storage Off Kitchen	south wall	drywall	black	0.00
10/18/2022	Basement Storage Off Kitchen	south wall	drywall	green	0.00



Date Location Color Reading Unit Substrate Basement 10/18/2022 Storage Off drywall south wall 0.00 orange Kitchen Basement 10/18/2022 0.09 Storage Off brown register metal Kitchen 10/18/2022 Calibration red 1.08 10/18/2022 Calibration 1.13 red 10/18/2022 Calibration red 1.12 Basement 10/18/2022 0.00 blue cabinet wood Kitchen Basement 10/18/2022 cabinet wood beige 0.00 Kitchen 10/18/2022 eave SE Exterior wood white 0.89 10/18/2022 Exterior gutter SE metal white 0.01 10/18/2022 Exterior downspout SE metal white 0.29 window frame 10/18/2022 0.00 Exterior metal white SE window grate 10/18/2022 Exterior black 0.00 metal NE 10/18/2022 Calibration red 1.03 ------10/18/2022 Calibration 1.11 red ------10/18/2022 1.09 Calibration red -------



APPENDIX D

LABORATORY ANALYTICAL DATA

EMSL Analytical, Inc. 4140 Litt Drive Hillside, IL 60162 EMSL Tel/Fax: (773) 313-0099 / (773) 313-0139

http://www.EMSL.com / chicagolab@emsl.com

EMSL Order: 262207918 Customer ID: TERR59 Customer PO: 01227204 Project ID:

Attention:	James Aamodt
	Terracon Consultants, Inc.
	1815 South Eisenhower St.
	Wichita, KS 67209

Phone: (316) 262-0171 Fax: (316) 262-6997 Received Date: 09/30/2022 10:23 AM **Analysis Date:** 10/04/2022 **Collected Date:**

Project: 01227204 TRINITY MENNONITE

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample Description Apparator % Fbrous % Non-Fibrous (Other) % Type 01-07-14_01 MULT PROPOSE With Value 95% Mn. Wool 5% Non-fibrous (Other) None Detected 01-07-14_02 LIBRAY-V Write/Value 95% Mn. Wool 5% Non-fibrous (Other) None Detected 01-07-14_02 LIBRAY-V Write/Value 95% Mn. Wool 5% Non-fibrous (Other) None Detected 01-07-14_03 NS CORRIDOR Write/Value 95% Mn. Wool 5% Non-fibrous (Other) None Detected 01-07-14_03 NS CORRIDOR Fanosa 95% Mn. Wool 5% Non-fibrous (Other) None Detected 02-0714-04 PATTERN Homogeneous 30% Leitulose 30% Nentitious (Other) None Detected 02-0714-05 N. EW CORRIDOR Tan/White 30% Ceitulose 30% Nentitious (Other) None Detected 02-0714-05 N. EW CORRIDOR Tan/White 30% Ceitulose 30% Nentitious (Other) None Detected 02-0714-05 N. EW CORRIDOR Tan/White 95% Ceitulose 30% Nentitionus (Other) None Detected				Asbestos		
D1-C7-L01 NULTIP URPOSE NODE Wile/View Provide 95% Min. Wool 9% Non-Horous (Other) None Detected 2523777-6001 ULBRARY - CELLING TLE_ZX4' WIPIN HOLE PATTERN Wile/View Provide 95% Min. Wool 5% Non-Horous (Other) None Detected 01-C71-02 ULBRARY - CELING TLE_ZX4' WIPIN HOLE PATTERN Minic/View Provide 95% Min. Wool 5% Non-Horous (Other) None Detected 01-C71-03 None Detected 95% Min. Wool 5% Non-Horous (Other) None Detected 01-C71-03 None Detected 95% Min. Wool 5% Non-Horous (Other) None Detected 01-C71-03 None Detected 95% Min. Wool 95% Min. Wool 95% Non-Horous (Other) None Detected 02-C71-04 PASTERN Tomogeneous 30% Cellulose 30% Min. Wool 30% Partite 10% Non-Horous (Other) None Detected 02-C71-05 N.E.W CORRIDOR - WILARGE HOLE - Horous Tomogeneous 30% Cellulose 30% Min. Wool 30% Forlite 10% Non-Horous (Other) None Detected 02-C71-05 N.E.W CORRIDOR - WILARGE HOLE - Horous Brown 30% Cellulose 30% Min. Wool 30% Forlite 10% Non-Horous (Other) None Detected 02-C71-05 ULBRARY - CREWINTAPE/JON - TOEMPOUND Brown S5% Cellulose 30% Min. Wool 5% Non-Horous (Other) Layer Not Present 03-WB1-04-CrUPON WILT-PURPOSE	Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
HOLE PATTERN Unital/allow 95% Min. Wool 5% Non-fbrous (Other) None Detected 01-CT4-02 LIBRARY - CELLING Minis/Vallow 95% Min. Wool 5% Non-fbrous (Other) None Detected 01-CT4-03 N-S CORRIDOR - Winis/Vallow 95% Min. Wool 5% Non-fbrous (Other) None Detected 2220791-000 Winis/Vallow 95% Min. Wool 5% Non-fbrous (Other) None Detected 2220791-000 WININ HOLE Homogeneous 30% Perite None Detected 22-CT4-04 PASTORS OFFICE - Tan/White 30% Cellulose 30% Perite None Detected 22-CT4-05 N. E-W CORNDOR - Tan/White 30% Cellulose 30% Perite None Detected 22-CT4-06 C. ELVORNDOR - Tan/White 30% Cellulose 30% Non-fbrous (Other) None Detected 22-CT4-05 ELW CORNDOR - Fibrous 30% Kin. Wool 10% Non-fbrous (Other) None Detected 22-CT4-06 E. N. S. CORNDOR - Fibrous 30% Kin. Wool 10% Non-fbrous (Other) None Detected 22-CT4-06 E. N. S. CORNIDOR - B	01-CT4-01 262207918-0001	MULTI PURPOSE ROOM - CEILING TILE,2'X4' W/PIN	White/Yellow Fibrous Homogeneous	95% Min. Wool	5% Non-fibrous (Other)	None Detected
01-C14-122 LIBRARY - CELING TILE 2X4 W/PIN 82007916-002 White/Yellow Horogeneous 95% Min. Wool 5% Non-fibrous (Other) None Detected 01-C14-03 NS CORRIDOR - CELING TILE 2X4' PATTERN White/Yellow Wilkin/HOLE PATTERN 95% Min. Wool 5% Non-fibrous (Other) None Detected 02-C14-04 PASTORS OFFICE - Tan/White 30% Cellulose 30% Peritie None Detected 02-C14-04 PASTORS OFFICE - Tan/White 30% Cellulose 30% Non-fibrous (Other) None Detected 02-C14-04 N EV CORRIDOR - PATTERN Tan/White 30% Cellulose 30% Non-fibrous (Other) None Detected 02-C14-04 N EV CORRIDOR - PATTERN Tan/White 30% Cellulose 30% Non-fibrous (Other) None Detected 02-C14-05 N EV CORRIDOR - PATTERN Tan/White 30% Cellulose 5% Non-fibrous (Other) None Detected 02-C14-06 E. NS CORRIDOR - PATTERN Brown White Persons 5% Cellulose 5% Non-fibrous (Other) None Detected 03-WB1-07-Gypsum CUTERN LIBRARY - CORRIDOR - CORRIDOR - CORRIDOR - CORRIDOR - CORPOUND Brown White Persons 95% Cellulose 5% Non-fibrous (Other) None Detected 03-WB1-07-Gypsum CORPOUND UBRARY - CORPOUND Tan/White 97% Non-fibrous (Other) None Detected 03-WB1-07-Jopit LIBRARY - CORPOUND Tan/		HOLE PATTERN				
01-CT4-03 N-S CORRIDOR - CELLING TILE_2X4' WITN HOLE PATTERN While/Yellow Fibrous 95% Min. Wool 5% Non-fibrous (Other) None Detected 22-CT4-04 PASTORS OFFICE PATTERN Tan/White Borous 30% Cellulose 30% Min. Wool 30% Perlite 10% Non-fibrous (Other) None Detected 22-CT4-04 PASTORS OFFICE PATTERN Tan/White Borous 30% Cellulose 30% Min. Wool 30% Perlite 10% Non-fibrous (Other) None Detected 22-CT4-05 N. E.W CORRIDOR - CELING TILE_2X4' WILARGE HOLE PATTERN Tan/White Fibrous 30% Cellulose 30% Min. Wool 30% Perlite 10% Non-fibrous (Other) None Detected 22-CT4-06 E. N-S CORRIDOR - CELING TILE_2X4' WILARGE HOLE PATTERN Brown/White PATTERN 95% Cellulose 30% Min. Wool 30% Non-fibrous (Other) None Detected 22-CT4-06 E. N-S CORRIDOR - CELING TILE_2X4' WILARGE HOLE PATTERN Brown/White PATTERN 95% Cellulose 95% Cellulose 5% Non-fibrous (Other) None Detected 32-WB1-07-Gypsum 03-WB1-07-Gypsum COMPOUND LiBRARY - COMPOUND Tan/White YOFS Non-fibrous (Other) 3% Chrysotie 32-WB1-07-Gypsum 03-WB1-07-Gypsum COMPOUND MULT-PURPOSE T COMPOUND Tan/White YOFS Non-fibrous (Other) 3% Chrysotie 22-WB1-07-Log 22-WB1-08-Gypsum COMPOUND White YOFS Non-fibrous (Other) 3% Chrysotie Layer Not Present 22-WB1-08-Gypsum COMPOUND White YOFS Non-fibrous (Other) 3% Chr	01-CT4-02 262207918-0002	LIBRARY - CEILING TILE,2'X4' W/PIN HOLE PATTERN	White/Yellow Fibrous Homogeneous	95% Min. Wool	5% Non-fibrous (Other)	None Detected
Out Need CELING TILE 27XF Fbrous Bork Min. Need Out Nein Michael (Mick) None Detected 28227378-6003 WPIN HOLE Tan/White 30% Cellulose 30% Perilie None Detected 28227378-6003 WILARGE HOLE Tan/White 30% Cellulose 30% Perilie None Detected 28227378-6003 WILARGE HOLE Homogeneous 30% Min. Wool 10% Non-fibrous (Other) None Detected 28227378-6003 WILARGE HOLE Homogeneous 30% Cellulose 30% Perilie None Detected 28227378-6003 WILARGE HOLE Homogeneous 30% Min. Wool 10% Non-fibrous (Other) None Detected 28207378-6005 WILARGE HOLE Homogeneous 95% Cellulose 5% Non-fibrous (Other) None Detected 28207378-6007 UBRARY - GYPSUMTAPEL/OIN Eaver Not Present Layer Not Present 28207378-6007 T COMPOUND None Detected 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-07-Gypsum LIBRARY - GYPSUMTAPEL/OIN Eaver Not Present 20% Non-fibrous (Other) 3% Chrysotile 2820738-60078 T COMPOUND None Detected 97% Non-fibrous (Other)	01-CT4-03		White/Yellow	95% Min Wool	5% Non-fibrous (Other)	None Detected
02-CT4-04 PASTOR'S OFFICE: CELLING TILE 2X4' WILARGE HOLE TarWhite Fibrous 30% Cellulose 30% Min. Wool 30% Paritie 10% Non-fibrous (Other) None Detected 02-CT4-05 N.E-W CORRIDOR CELLING TILE 2X4' Fibrous TarWhite Fibrous 30% Cellulose 30% Paritie 10% Non-fibrous (Other) None Detected 02-CT4-05 N.E-W CORRIDOR CELLING TILE 2X4' Fibrous TarWhite Fibrous 30% Cellulose 30% Non-fibrous (Other) None Detected 02-CT4-06 E.N.S CORRIDOR CELLING TILE 2X4' Fibrous Brown/White Fibrous 95% Cellulose 5% Non-fibrous (Other) None Detected 02-CT4-06 E.N.S CORRIDOR CHING TILE 2X4' PATTERN Brown/White Fibrous 95% Cellulose 5% Non-fibrous (Other) None Detected 02-WB1-07-Gypsum COMPOUND LIBRARY - COMPOUND Brown/White GYPSUM/TAPE/JOIN T COMPOUND TarWhite Stature 95% Cellulose 5% Non-fibrous (Other) 3% Chrysotile 03-WB1-07-Gypsum COMPOUND LIBRARY - COMPOUND TarWhite Stature TarWhite Stature 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-07-Grape MULT-PURPOSE ROOM - COMPOUND TarWhite Stature 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Gypsum COMPOUND MULT-PURPOSE ROOM - COMPOUND TarWhite Fibrous 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Gypsum COMPOUND<	262207918-0003	CEILING TILE,2'X4' W/PIN HOLE PATTERN	Fibrous Homogeneous			
CELLING TILE 2X4' PATTERN Fibrous Homogeneous 30% Min. Wool 10% Non-fibrous (Other) 02: CT4-05 N. E-W CORRIDOR - CELLING TILE 2X4' Fibrous Tan/White 30% Cellulose 30% Perilte None Detected 02: CT4-05 WILARCE HOLE PATTERN Tan/White 30% Cellulose 30% Non-fibrous (Other) None Detected 02: CT4-06 E. N.S CORRIDOR - CELING TILE 2X4' Fibrous Forous 95% Cellulose 5% Non-fibrous (Other) None Detected 02: CT4-06 E. N.S CORRIDOR - CHING TERN Forous 95% Cellulose 5% Non-fibrous (Other) None Detected 02: CT4-06 E. N.S CORRIDOR - CHING TERN Forous Eaver Not Present Cellulose 5% Non-fibrous (Other) None Detected 03: WB1-07-Gypsum LIBRARY - GYPSUMTAPELJOIN Layer Not Present Compound GYPSUMTAPELJOIN Layer Not Present 22207916-0007 T COMPOUND Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 03: WB1-07-Joint COMPOUND LIBRARY - GYPSUMTAPELJOIN Tan/White 98% Cellulose 2% Non-fibrous (Other) None Detected 03: WB1-08-Gypsum ACOM - COMPOUND MULTI-PURPOSE COMPO	02-CT4-04	PASTOR'S OFFICE -	Tan/White	30% Cellulose	30% Perlite	None Detected
22-CT4-05 CEILING TILE 2X4' 282207916-0005 WL/RGE HOLE PATTERN Tan/White birous 30% Cellulose 30% Mn. Wool 30% Perite 10% Non-fibrous (Other) None Detected 22-CT4-06 CEILING TILE 2X4' PATTERN EN SCORRIDOR - CEILING TILE 2X4' PATTERN Brown/White CEILING TILE 2X4' CEILING TILE 2X4' PATTERN 95% Cellulose 5% Non-fibrous (Other) None Detected 282207916-0006 MULARGE HOLE PATTERN Homogeneous 95% Cellulose 5% Non-fibrous (Other) None Detected 282207916-0006 LIBRARY - GYPSUMTAPE/JOIN T COMPOUND Tan/White Homogeneous 95% Cellulose 5% Non-fibrous (Other) Layer Not Present 282207916-0007A T COMPOUND Tan/White Homogeneous 97% Non-fibrous (Other) 3% Chrysotile 282207916-0007A T COMPOUND Non-Fibrous Homogeneous 97% Non-fibrous (Other) 3% Chrysotile 282207916-0007A COMPOUND T COMPOUND MULTI-PURPOSE ROOM - COMPOUND Fibrous Homogeneous 98% Cellulose 2% Non-fibrous (Other) None Detected 282207916-0008 GYPSUMTAPE/JOIN T COMPOUND Tan/White Homogeneous 98% Cellulose 2% Non-fibrous (Other) None Detected 282207916-0008 GYPSUMTAPE/JOIN T COMPOUND Tan/White Homogeneous 97% Non-fibrous (Other) 3% Chrysotile	262207918-0004	CEILING TILE.2'X4' W/LARGE HOLE PATTERN	Fibrous Homogeneous	30% Min. Wool	10% Non-fibrous (Other)	
CELLING TILE 2:X4' PATTERN Fibrous Homogeneous PATTERN 30% Min. Wool 10% Non-fibrous (Other) 02-CT4-06 E. N-S CORRIDOR - CELING TILE 2:X4' Fibrous Brown/White Brown/White PATTERN 95% Cellulose 5% Non-fibrous (Other) None Detected 22207918-0005 WILARGE HOLE PATTERN Brown/White Brown/White GYPSUMTAPE/JOIN 22207918-0007 95% Cellulose 5% Non-fibrous (Other) None Detected 03-WB1-07-Gypsum 22207918-0007 LIBRARY - GYPSUMTAPE/JOIN 22207918-0007A Layer Not Present Layer Not Present 22207918-0007A COMPOUND Tan/White GYPSUMTAPE/JOIN COMPOUND 97% Non-fibrous (Other) 3% Chrysotile 22207918-0007A COMPOUND Tan/White GYPSUMTAPE/JOIN COMPOUND 98% Cellulose 2% Non-fibrous (Other) 3% Chrysotile 22207918-0007B MULT-PURPOSE ROOM - TCOMPOUND White GYPSUMTAPE/JOIN TCOMPOUND 98% Cellulose 2% Non-fibrous (Other) None Detected 22207918-0007B MULT-PURPOSE ROOM - COMPOUND White GYPSUMTAPE/JOIN TCOMPOUND 98% Cellulose 2% Non-fibrous (Other) None Detected 22207918-0007B TCOMPOUND Non-Fibrous Homogeneous 97% Non-fibrous (Other) None Detected 22207918-0007B TCOMPOUND Non-Fibrous Homogeneous 97% Non-fibrous (Other) None Detected 22207918-0007B TCOMPOUND Non-Fibrous Homogeneous </td <td>02-CT4-05</td> <td>N. E-W CORRIDOR -</td> <td>Tan/White</td> <td>30% Cellulose</td> <td>30% Perlite</td> <td>None Detected</td>	02-CT4-05	N. E-W CORRIDOR -	Tan/White	30% Cellulose	30% Perlite	None Detected
22-CT4-06 E. N.S CORRIDOR - CELLING TILE_ZX4' WLARCE HOLE Brown/White Fibrous 95% Cellulose 5% Non-fibrous (Other) None Detected 23-WB 1-07-Gypsum PATTERN LiBRARY - GYPSUMTAPE/JOIN Z2227918-0007 Layer Not Present Layer Not Present 23-WB 1-07-Gypsum Z2227918-0007 LIBRARY - T COMPOUND Layer Not Present Layer Not Present 23-WB 1-07-Joint Compound LIBRARY - GYPSUMTAPE/JOIN T COMPOUND Tan/White Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 23-WB 1-07-Joint Compound LIBRARY - GYPSUMTAPE/JOIN T COMPOUND Tan/White Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 23-WB 1-07-Joint Compound LIBRARY - GYPSUMTAPE/JOIN T COMPOUND Tan/White Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 23-WB 1-08-Gypsum 22207918-00058 MULTI-PURPOSE ROOM - Z2207918-00058 White ROOM - GYPSUMTAPE/JOIN T COMPOUND 98% Cellulose 2% Non-fibrous (Other) None Detected None-Fibrous 23-WB 1-08-Joint Compound MULTI-PURPOSE ROOM - GYPSUMTAPE/JOIN T COMPOUND Tan/White Non-Fibrous 98% Cellulose 2% Non-fibrous (Other) None Chrysotile 23-WB 1-08-Joint Compound MULTI-PURPOSE ROOM - GYPSUMTAPE/JOIN T COMPOUND Tan/White Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 23-WB 1-0	262207918-0005	CEILING TILE.2'X4' W/LARGE HOLE PATTERN	Fibrous Homogeneous	30% Min. Wool	10% Non-fibrous (Other)	
CEILING TILE.2'X4 Fibrous 262207916-0005 WILARGE HOLE Homogeneous PATTERN Layer Not Present 03-WB1-07-Gypsum LIBRARY - GYPSUM/TAPE/JOIN Layer Not Present 262207916-0007 T COMPOUND Silver Not Present 262207916-0007A T COMPOUND Non-Fibrous 262207916-0007B Tan/White 97% Non-fibrous (Other) 262207916-0007B MULTI-PURPOSE ROOM - T COMPOUND Non-Fibrous 262207916-0007B MULTI-PURPOSE ROOM - T COMPOUND White 98% Cellulose 2% Non-fibrous (Other) None Detected 262207916-0008 GYPSUM/TAPE/JOIN T COMPOUND Homogeneous Silver Non-fibrous (Other) None Detected 262207916-0008 GYPSUM/TAPE/JOIN T COMPOUND Homogeneous Silver Non-fibrous (Other) None Detected 262207916-0008 GYPSUM/TAPE/JOIN T COMPOUND Homogeneous Silver Non-fibrous (Other) None Detected 262207916-0008 GYPSUM/TAPE/JOIN T COMPOUND Homogeneous Silver Non-fibrous (Other) None Compound 262207916-0008 T COMPOUND Non-Fibrous Si	02-CT4-06	E. N-S CORRIDOR -	Brown/White	95% Cellulose	5% Non-fibrous (Other)	None Detected
03-WB1-07-Gypsum LIBRARY - GYPSUM/TAPE/JOIN Layer Not Present 03-WB1-07-Tape LIBRARY - GYPSUM/TAPE/JOIN Layer Not Present 03-WB1-07-Tape LIBRARY - GYPSUM/TAPE/JOIN Tan/White 03-WB1-07-Joint LIBRARY - GYPSUM/TAPE/JOIN Tan/White 03-WB1-07-Joint LIBRARY - GYPSUM/TAPE/JOIN Tan/White 03-WB1-07-Joint LIBRARY - Compound Tan/White 03-WB1-08-Gypsum MULTI-PURPOSE ROOM - T COMPOUND Non-Fibrous 282207918-0008 MULTI-PURPOSE ROOM - T COMPOUND White 98% Cellulose 282207918-0008A GYPSUM/TAPE/JOIN T COMPOUND None Detected 03-WB1-08-Joint MULTI-PURPOSE ROOM - T COMPOUND White 98% Cellulose 282207918-0008A GYPSUM/TAPE/JOIN T COMPOUND None Detected 03-WB1-08-Joint MULTI-PURPOSE ROOM - T COMPOUND Tan/White 97% Non-fibrous (Other) None Detected 03-WB1-08-Gypsum MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Gypsum MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Ogypsum MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Ogypsum T COMPOUND NOR-Fibrous 1 <td>262207918-0006</td> <td>CEILING TILE.2'X4' W/LARGE HOLE PATTERN</td> <td>Fibrous Homogeneous</td> <td></td> <td></td> <td></td>	262207918-0006	CEILING TILE.2'X4' W/LARGE HOLE PATTERN	Fibrous Homogeneous			
03-WB1-07-Tape LIBRARY - GYPSUM/TAPE/JOIN Layer Not Present 262207918-0007A T COMPOUND 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-07-Joint LIBRARY - GYPSUM/TAPE/JOIN T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 262207918-00078 T COMPOUND Non-Fibrous Present 2% 03-WB1-08-Gypsum MULTI-PURPOSE ROOM - 262207918-0008 GYPSUM/TAPE/JOIN T COMPOUND Layer Not Present 262207918-0008 GYPSUM/TAPE/JOIN T COMPOUND Present 2% Non-fibrous (Other) None Detected 03-WB1-08-Tape MULTI-PURPOSE ROOM - T COMPOUND White 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Tape MULTI-PURPOSE ROOM - T COMPOUND Fibrous 97% Non-fibrous (Other) None Detected 03-WB1-08-Joint MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Joint MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN Non-Fibrous Layer Not Present 262207918-0009 T COMPOUND Eazerore structure Layer Not Present <td>03-WB1-07-Gypsum</td> <td>LIBRARY - GYPSUM/TAPE/JOIN T COMPOUND</td> <td></td> <td></td> <td></td> <td>Layer Not Present</td>	03-WB1-07-Gypsum	LIBRARY - GYPSUM/TAPE/JOIN T COMPOUND				Layer Not Present
262207918-0007A LIBRARY - GYPSUM/TAPE/JOIN T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 262207918-0007B MULTI-PURPOSE ROOM - Se2207918-0008 MULTI-PURPOSE ROOM - T COMPOUND Layer Not Present 262207918-0008 GYPSUM/TAPE/JOIN T COMPOUND Se2207918-0008 2% Non-fibrous (Other) None Detected 03-WB1-08-Tape MULTI-PURPOSE ROOM - T COMPOUND White 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Tape MULTI-PURPOSE ROOM - T COMPOUND Fibrous 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Joint MULTI-PURPOSE ROOM - T COMPOUND Tan/White 97% Non-fibrous (Other) None Detected 03-WB1-08-Joint MULTI-PURPOSE ROOM - T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum MURSERY - GYPSUM/TAPE/JOIN GYPSUM/TAPE/JOIN Non-Fibrous Homogeneous 1 Layer Not Present 262207918-0009 T COMPOUND Support Appe/JOIN Layer Not Present 2	03-WB1-07-Tape	LIBRARY - GYPSUM/TAPE/JOIN				Layer Not Present
03-WB1-07-JOINT ELEXART - Tail/Wille S7 % Non-Fibrous (Other) 3.% Chrysolile Compound GYPSUM/TAPE/JOIN T COMPOUND Homogeneous 262207918-0008 GYPSUM/TAPE/JOIN T COMPOUND EXCEPTION ON - Fibrous GYPSUM/TAPE/JOIN T COMPOUND EXCEPTION ON - Fibrous GYPSUM/TAPE/JOIN T COMPOUND -	202207918-0007A		Top/M/bito		07% Non fibrous (Other)	2% Chrysotila
262207918-0007B MULTI-PURPOSE ROOM - SE2207918-0008 MULTI-PURPOSE GYPSUM/TAPE/JOIN T COMPOUND Layer Not Present 03-WB1-08-Tape MULTI-PURPOSE ROOM - ROOM - T COMPOUND White Fibrous 98% Cellulose 2% Non-fibrous (Other) None Detected 262207918-0008A GYPSUM/TAPE/JOIN T COMPOUND Homogeneous T COMPOUND 97% Non-fibrous (Other) None Detected 03-WB1-08-Joint Compound MULTI-PURPOSE T COMPOUND Tan/White Non-Fibrous Homogeneous 97% Non-fibrous (Other) 3% Chrysotile 262207918-0008B T COMPOUND Non-Fibrous GYPSUM/TAPE/JOIN T COMPOUND Tan/White Homogeneous 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN T COMPOUND Layer Not Present Layer Not Present 262207918-0009 T COMPOUND T COMPOUND Layer Not Present	Compound	GYPSUM/TAPE/JOIN T COMPOUND	Non-Fibrous Homogeneous			3% Chrysolie
03-WB1-08-Gypsum MULTI-PURPOSE ROOM - Sep207918-0008 Layer Not Present 262207918-0008 GYPSUM/TAPE/JOIN T COMPOUND 98% Cellulose 2% Non-fibrous (Other) None Detected 03-WB1-08-Tape MULTI-PURPOSE ROOM - Fibrous 98% Cellulose 2% Non-fibrous (Other) None Detected 262207918-0008A GYPSUM/TAPE/JOIN T COMPOUND Homogeneous T COMPOUND 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Joint Compound MULTI-PURPOSE GYPSUM/TAPE/JOIN BOM - Tan/White Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 262207918-0008B T COMPOUND Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN GYPSUM/TAPE/JOIN Homogeneous T COMPOUND Layer Not Present 262207918-0009 T COMPOUND Layer Not Present Layer Not Present	262207918-0007B					
03-WB1-08-Tape MULTI-PURPOSE ROOM - White Fibrous 98% Cellulose 2% Non-fibrous (Other) None Detected 262207918-0008A GYPSUM/TAPE/JOIN T COMPOUND Homogeneous 2 2% Non-fibrous (Other) None Detected 03-WB1-08-Joint MULTI-PURPOSE T COMPOUND Tan/White 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Joint MULTI-PURPOSE ROOM - Non-Fibrous Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-08-Joint MULTI-PURPOSE GYPSUM/TAPE/JOIN B03-WB1-09-Gypsum T COMPOUND Homogeneous 97% Non-fibrous (Other) 3% Chrysotile 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN Layer Not Present Layer Not Present 262207918-0009 T COMPOUND T COMPOUND Layer Not Present	03-WB1-08-Gypsum 262207918-0008	MULTI-PURPOSE ROOM - GYPSUM/TAPE/JOIN T COMPOUND				Layer Not Present
282207918-0008A GYPSUM/TAPE/JOIN T COMPOUND Homogeneous 03-WB1-08-Joint MULTI-PURPOSE Tan/White 97% Non-fibrous (Other) 3% Chrysotile Compound ROOM - Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile Compound ROOM - Non-Fibrous 97% Non-fibrous (Other) 3% Chrysotile 262207918-0008B T COMPOUND Homogeneous Eager Not Present 03-WB1-09-Gypsum NURSERY - Layer Not Present 03-WB1-0909 T COMPOUND Eager Not Present	03-WB1-08-Tape	MULTI-PURPOSE ROOM -	White Fibrous	98% Cellulose	2% Non-fibrous (Other)	None Detected
03-WB1-08-Joint CompoundMULTI-PURPOSE ROOM - GYPSUM/TAPE/JOINTan/White Non-Fibrous Homogeneous97% Non-fibrous (Other)3% Chrysotile262207918-0008BT COMPOUNDHomogeneous	262207918-0008A	GYPSUM/TAPE/JOIN T COMPOUND	Homogeneous			
Compound ROOM - GYPSUM/TAPE/JOIN Non-Fibrous Homogeneous 262207918-0008B T COMPOUND 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN Layer Not Present 262207918-0009 T COMPOUND	03-WB1-08-Joint	MULTI-PURPOSE	Tan/White		97% Non-fibrous (Other)	3% Chrysotile
202207918-0003B F COMP COND 03-WB1-09-Gypsum NURSERY - GYPSUM/TAPE/JOIN 262207918-0009 T COMPOUND	Compound	ROOM - GYPSUM/TAPE/JOIN T.COMPOLIND	Non-Fibrous Homogeneous			
262207918-0009 T COMPOUND	03-WB1-09-Gypsum	NURSERY - GYPSUM/TAPE/JOIN				Layer Not Present
	262207918-0009	T COMPOUND				



 EMSL Order:
 262207918

 Customer ID:
 TERR59

 Customer PO:
 01227204

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Туре	
03-WB1-09-Tape 262207918-0009A	NURSERY - GYPSUM/TAPE/JOIN T COMPOUND				Layer Not Present	
03-WB1-09-Joint Compound	NURSERY - GYPSUM/TAPE/JOIN T COMPOUND	White Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile	
262207918-0009B						
04-MG3-10-Cove Base 262207918-0010	MULTI-PURPOSE ROOM - COVEBASE/MASTIC	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
04-MG3-10-Mastic	MULTI-PURPOSE ROOM -	Beige Non-Fibrous		100% Non-fibrous (Other)	None Detected	
262207918-0010A	COVEBASE/MASTIC	Homogeneous				
04-MG3-11-Cove Base	RESTRROM OFF N. E-W CORRIDOR -	Beige Non-Fibrous		100% Non-fibrous (Other)	None Detected	
04-MG3-11-Mastic	RESTRROM OFF N. E-W CORRIDOR -	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected	
262207918-0011A	COVEBASE/MASTIC	Homogeneous				
04-MG3-12-Cove Base 262207918-0012	CHAPEL - COVEBASE/MASTIC	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
04-MG3-12-Mastic	CHAPEL - COVEBASE/MASTIC	Clear Non-Fibrous		100% Non-fibrous (Other)	None Detected	
262207918-0012A		Homogeneous				
05-FT3-13	KITCHEN - 9"X9" FLOOR TILE	Gray Non-Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile	
202207918-0013		Crav		07% Non fibrous (Other)	20/ Chrysotile	
262207918-0014	FLOOR TILE	Gray Non-Fibrous Homogeneous			3% Chrysotile	
05-FT3-15	N. E-W CORRIDOR - 9"X9" FLOOR TILE	Gray Non-Fibrous		97% Non-fibrous (Other)	3% Chrysotile	
262207918-0015		Homogeneous				
06-MA4-16 262207918-0016	WOMEN'S RESTROOM - 4"X4" CERAMIC TILE GROUT	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
06-MA4-17	WOMEN'S	White		100% Non-fibrous (Other)	None Detected	
262207918-0017	RESTROOM - 4"X4" CERAMIC TILE GROUT	Non-Fibrous Homogeneous				
06-MA4-18	WOMEN'S RESTROOM - 4"X4"	White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
262207918-0018	CERAMIC TILE GROUT	Homogeneous				
06-MA4-19	KITCHEN - 1"X1" CERAMIC TILE	Gray Non-Fibrous		100% Non-fibrous (Other)	None Detected	
262207918-0019	GROUT	Homogeneous				
06-MA4-20	MEN'S RESTROOM - 1"X1" CERAMIC TILE	Gray Non-Fibrous		100% Non-fibrous (Other)	None Detected	
06 MAA 04		Crov		100% Non fibrows (Other)	Nono Dotacted	
262207918-0021	1"X1" CERAMIC TILE GROUT	Non-Fibrous Homogeneous		ι του // Νοιταιι-ποιτού (Οτηθεί)	NOTE Detected	



EMSL Analytical, Inc. 4140 Litt Drive Hillside, IL 60162

Tel/Fax: (773) 313-0099 / (773) 313-0139 http://www.EMSL.com / chicagolab@emsl.com EMSL Order: 262207918 Customer ID: TERR59 Customer PO: 01227204 Project ID:

Analyst(s)

Mazen Elkhatib (17) Selina Zeiss (8)

for P. Hh

James Hahn, Laboratory Manager or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Hillside, IL NVLAP Lab Code 200399-0

Initial report from: 10/04/2022 10:38:12

EMSL	EMSL Analytical, Inc. 4140 Litt Drive, Hillside, IL 60162 Phone/Fax: (773) 313-0099 / (773) 313-0139 http://www.EMSL.com chicagolab@emsl.com	om		EMSL Order: CustomerID: CustomerPO: ProjectID:	262207881 TERR59 01227204
Attn: James Aar Terracon (1815 Sout Wichita, K	modt Consultants, Inc. h Eisenhower St. S 67209	Phone: Fax: Received: Collected:	(316) 262-0171 (316) 262-6997 9/30/2022 10:23 / 9/28/2022	AM	
Project: 01227204 T Test	RINITY MENNONITE Report: Lead in Paint Chips by Fl	ame AAS (S	W 846 3050B	/7000B)*	

Client Sample Description	Lab ID Collected	Analyzed	Weight	Concentration
P1	262207881-0001 9/28/2022		n/a	Not Enough ppm Sample
	Site: MULTI-PURPOSE RO	OM - YELLOW		
P2*	262207881-0002 9/28/2022	10/3/2022	0.0306 g	<0.065 % wt
	Site: LIBRARY - WHITE			
P3	262207881-0003 9/28/2022		n/a	Not enough ppm Sample
	Site: CHAPEL - BEIGE			

*Data reported may not reach applicable analytical sensitivity due to insufficient sample weights submitted. Suggested weight for analysis is 0.25 g to reach the RL of 0.008 %wt.

isa M. Odeshoo

Lisa Odeshoo, Lead Lab Manager or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.

specifications unless otherwise noted. * Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request. Samples analyzed by EMSL Analytical, Inc. Hillside, IL AIHA-LAP, LLC--ELLAP Accredited #102992

Initial report from 10/03/2022 13:04:21

EMSL Order: 392211307 **EMSL** Analytical, Inc. Customer ID: TERR59 100 Green Park Industrial Court Saint Louis, MO 63123 MSL Customer PO: 01227204 Tel/Fax: (314) 577-0150 / (314) 776-3313 Project ID: http://www.EMSL.com / saintlouislab@emsl.com Attention: Will Wright **Phone:** (316) 448-4585 Terracon Consultants, Inc. Fax: (316) 262-6997 1815 South Eisenhower Received Date: 10/19/2022 10:05 AM Wichita, KS 67209 **Analysis Date:** 10/19/2022 **Collected Date:** Project: Trinity Mennonite 01227204

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos			
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Туре	
01-CT4-22		Various Fibrous	93% Min. Wool	7% Non-fibrous (Other)	None Detected	
392211307-0001		Heterogeneous				
02-CT4-23		Various Fibrous	30% Cellulose 40% Min. Wool	15% Perlite 15% Non-fibrous (Other)	None Detected	
392211307-0002		Homogeneous				
03-WB1-24		Various Non-Fibrous	20% Cellulose 2% Glass	78% Non-fibrous (Other)	<1% Chrysotile	
392211307-0003 Calculated composite result.		Heterogeneous				
04-MG3-25-Cove Base		Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected	
392211307-0004		Homogeneous				
04-MG3-25-Adhesive		Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected	
392211307-0004A		Homogeneous				
07-FT2-26-VFT		Various Non-Fibrous		96% Non-fibrous (Other)	4% Chrysotile	
392211307-0005		Homogeneous				
07-FT2-26-Adhesive		Black Non-Fibrous		100% Non-fibrous (Other)	None Detected	
392211307-0005A		Homogeneous				
07-F12-27-VF1		various Non-Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile	
		Black		100% Non fibrous (Other)	None Detected	
392211307-0006A		Non-Fibrous Homogeneous			None Delected	
07_FT2_28_\/FT		Various		97% Non-fibrous (Other)	3% Chrysotile	
392211307-0007		Non-Fibrous Homogeneous				
07-FT2-28-Adhesive		Black		100% Non-fibrous (Other)	None Detected	
392211307-0007A		Non-Fibrous Homogeneous				
		White	05% Eibrous (Other)	5% Non fibrous (Other)	None Detected	
392211307-0008		Fibrous Homogeneous			None Delected	
08-M 1/1-29-Fitting		White	2% Synthetic	73% Non-fibrous (Other)	5% Chrysotile	
392211307-0008A		Non-Fibrous Homogeneous	20% Min. Wool			
08-M.I4-30-Fitting		White	95% Fibrous (Other)	5% Non-fibrous (Other)	None Detected	
202211207 0000		Fibrous				
392211307-0009		Homogeneous	00/ 0			
08-MJ4-30-Fitting		Non-Fibrous	20% Min. Wool	73% Non-fibrous (Other)	4% Chrysotile	
09 M 14 21 Eitting		White	05% Eibroug (Other)	5% Non fibrous (Other)	None Detected	
392211307-0010		Fibrous Homogeneous	95% Fibrous (Other)		NOTE Delected	
Initial report from: 10/19/	2022 19:23:02					

ASB PLM 0008 0001 - 1.78 Printed: 10/19/2022 6:23 PM



Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Asbestos		
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Туре
08-MJ4-31-Fitting		White Non-Fibrous Homogeneous	8% Synthetic 5% Min. Wool	82% Non-fibrous (Other)	5% Chrysotile
09-PI4-32-Piping		Various Non-Fibrous Heterogeneous	20% Cellulose 25% Fibrous (Other)	55% Non-fibrous (Other)	None Detected
09-PI4-32-Piping		Tan Fibrous Homogeneous	97% Min. Wool	3% Non-fibrous (Other)	None Detected
09-PI4-33-Piping		Various Non-Fibrous Heterogeneous	20% Cellulose 28% Fibrous (Other)	52% Non-fibrous (Other)	None Detected
09-PI4-33-Piping		Tan Fibrous Homogeneous	95% Min. Wool	5% Non-fibrous (Other)	None Detected
09-PI4-34-Piping		Various Non-Fibrous Heterogeneous	25% Cellulose 20% Fibrous (Other)	55% Non-fibrous (Other)	None Detected
09-PI4-34-Piping		Tan Fibrous Homogeneous	96% Min. Wool	4% Non-fibrous (Other)	None Detected
10-CA5-35 392211307-0014		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
10-CA5-36 392211307-0015		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
10-CA5-37 392211307-0016		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile

Analyst(s)

Donald Schmidt (19) Sarah Kuper (7)

my W. Li.

Jeff Siria, Laboratory Manager or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Saint Louis, MO NVLAP Lab Code 200742-0

Initial report from: 10/19/2022 19:23:02


Attention:	Will Wright	Phone:	(316) 448-4585
	Terracon Consultants, Inc.	Fax:	(316) 262-6997
	1815 South Eisenhower	Received:	10/20/2022 8:00 AM
	Wichita, KS 67209	Analysis Date:	10/20/2022
		Collected:	

Project: Trinity Mennonite 01227204

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy. Quantitation using 400 Point Count Procedure

			<u>Non-</u>	Asbestos	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Туре
10-CA5-35 392211369-0001		Gray Non-Fibrous Homogeneous		99.50% Non-fibrous (Other)	0.50%Chrysotile
10-CA5-36 392211369-0002		Gray Non-Fibrous Homogeneous		99.50% Non-fibrous (Other)	0.50%Chrysotile
10-CA5-37 392211369-0003		Gray Non-Fibrous Homogeneous		99.50% Non-fibrous (Other)	0.50%Chrysotile

Analyst(s)

yW. f. Jeff Siria, Laboratory Manager

leff Siria, Laboratory Manage or other approved signatory

Donald Schmidt (1) Sarah Kuper (2)

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample.

Samples analyzed by EMSL Analytical, Inc. Saint Louis, MO NVLAP Lab Code 200742-0

Initial report from: 10/20/2022 13:39:20



APPENDIX E

LICENSES AND CERTIFICATIONS

lerracon

ASBESTOS INSPECTOR REFRESHER COURSE CERTIFICATE

This is to certify that **Jim E. Aamodt**

has completed the requisite training for asbestos accreditation under TSCA Title II and 40 CFR 763 and passed the associated examination with a score of at least 70%.

Accredited by the Missouri Department of Natural Resources

Certificate Number: 102221TERWICIR001

Course Location:ONLINECourse Date:October 22, 2021Examination Date:October 22, 2021Expiration Date:October 22, 2022

Course Instructor

Terracon Consultants, Inc. 1815 South Eisenhower Street Wichita, Kansas 67209 (316) 262-0171





ASBESTOS INSPECTOR REFRESHER COURSE CERTIFICATE

This is to certify that **Jim Aamodt**

has completed the requisite training for asbestos accreditation under TSCA Title II and 40 CFR 763 and passed the associated examination with a score of at least 70%.

Accredited by the Missouri Department of Natural Resources

Certificate Number: 101922TERWICIR001

Course Instructor

Course Location:VIRTUALCourse Date:October 19, 2022Examination Date:October 19, 2022Expiration Date:October 20, 2023

Terracon Consultants, Inc. 1815 South Eisenhower Street Wichita, Kansas 67209 (316) 262-0171



APPENDIX F

PHOTOS

Trinity Mennonite Church = 211 S. Elm Street, Hillsboro, KS Photos Taken: September 28, 2022 = Project No. 01227204





Photo #1 Chapel (04-MG3-12, P-2)



Photo #2 Banquet Hall (04-MG3-12, P-2)

Asbestos and Lead Survey

Trinity Mennonite Church = 211 S. Elm Street, Hillsboro, KS Photos Taken: September 28, 2022 = Project No. 01227204





Photo #3 Multi-Purpose Room (01-CT4-01, 03-WB1-08, 04-MG3-10, P-1)



Photo #4 Nursery (03-WB1-09, P-7, P-8, P-9)







Photo #5 Library (01-CT4-02, 03-WB1-07, P-4, P-5, P-6)



Photo #6 Library (01-CT4-02, 03-WB1-07, P-4, P-5, P-6)





Photo #7 Kitchen (05-FT3-13, 05-FT3-14, 07-MA4-19, P-3)



Photo #8 Kitchen (05-FT3-13, 05-FT3-14, 07-MA4-19, P-3)

Trinity Mennonite Church = 211 S. Elm Street, Hillsboro, KS Photos Taken: September 28, 2022 = Project No. 01227204





Photo #9 South E-W Corridor (01-CT4-03)



Photo #10 North E-W Corridor (01-CT4-03, 02-CT4-06, 05-FT3-15)

Asbestos and Lead Survey

Trinity Mennonite Church = 211 S. Elm Street, Hillsboro, KS Photos Taken: September 28, 2022 = Project No. 01227204





Photo #11 Men's Restroom (02-CT4-05, 07-MA4-20, 07-MA4-21)



Photo #12 Restroom off N. E-W Corridor (04-MG3-11)





Photo #13 9"x9" Floor tile in N. E-W Corridor and Kitchen (05-FT3-15)



Photo #14 Rubber Cove Base (typical)

General

Survey CFP Code Footprint ADA ADA Diagrams

Demolition

D1.1 Site Demolition Plan

D1.2 Photographs

Section

A3.1 Exterior Elevations

Wall Sections

Wall Sections

A5.1 Roof Plan

D2.1 First Floor Demolition Plan

Enlarged Playground Plans

Composite Floor Plans

First Floor Plan Area A

First Floor Plan Area B

Exterior Elevations & Building Sections

First Floor Reflected Ceiling Plan & Details

Architectural A1.1 Site Plan

A1.2

A1.3

A2.0

A2.1

A2.2

A3.2 A4.1

A4.2

A7.1

A7.2

A8.3 Bathroom Elevations & SectionsA9.1 Interior ElevationsA9.2 Interior Elevations

D2.3 Photographs

D2.2 Basement Demolition Plan

- A9.3 Interior Elevations
- A9.4 Interior Elevations
- A9.5 Interior Elevations
- A9.6 Casework Elevations
- A9.7 Casework Elevations
- A9.8 Casework Elevations & SectionsA9.9 Alternate Interior Elevations
- A9.10 Alternate Interior Elevations
- A10.1 Finish Schedules
- A10.2 Door & Window Schedule

Foundation Details

Framing Details

A10.3 Details

S3.1

S3.2

A8.1 Enlarged Bathroom Plans A8.2 Bathroom Elevations

Structural

S0.1 General Notes and Typical Details

Basement Reflected Ceiling Plan

- S2.1 Foundation Plan
- S2.2 Framing Plan

Mechanical

ME1.1 First Floor M/E Demolition Plan First Floor Domestic Water Plan M1.7 ME1.2 Basement M/E Demolition Plan M1.8 Basement Domestic Water Plan First Floor Ductwork Plan M6.1 Schedules M1.1 Basement Ductwork Plan M6.2 Schedules M1.2 First Floor HVAC Piping Plan M1.3 M6.3 Details Basement HVAC Piping Plan M1.4 M6.4 Details M1.5 First Floor Waste & Vent Plan Basement Waste & Vent Plan M1.6

Electrical							
E1.1	First Floor Lighting Plan	E1.5	Basement Special Systems Plan				
E1.2	First Floor Power Plan	E6.1	Schedule & Details				
E1.3	Partial Basement Power Plan	E6.2	Schedules				
E1.4	First Floor Special Systems Plan						

Food Service

FS1.1 Food Service

Alternates

- 1 Remove Office Addition
- 2 Concrete Parking
- 3 Replace Basement Ceiling Tiles
- 4 Replace Basement Ceiling Tiles
- 5 Front Reception Desk
- 6 Concrete Base for Poured Rubber Mulch

GENERAL WORK REQUIREMENTS

1. GENERAL

Should conflict occur between these General Work Requirements and the General Conditions, the requirements of this Section take precedence.

2. INTENT OF DOCUMENTS

The Contract Drawings are complementary and what is called for by anyone shall be as binding as if called by all. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work.

3. MANUFACTURER'S DIRECTIONS

All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturers, unless herein specified to the contrary.

4. BUILDING PERMIT

As stated in Subparagraph 4.7.1, AIA DOCUMENT A201, General Conditions, the General Contractor shall secure and pay for the building permit.

5. MATERIALS - EQUIPMENT - SUBSTITUTION

- A. In general, these Specifications identify the required materials and equipment by naming one or more manufacturers, brand, model, catalog number, and/or other identification; the first-named manufacturer's product used as a basis for design; the other named brands considered equivalent. Equivalent brand manufacturers named must furnish products consistent with the Specifications for the first-named product, as determined by the Architect. Base Bid shall include only those brands named and must be used on the project, except as hereinafter provided.
- B. Materials or equipment specified exclusively, Base Bid shall be based on same and used on project, except as hereinafter provided.
- C. Prior to receipt of bids, should Contractor wish to incorporate in Base Bid, brands or products other than those named in the Specifications, he shall submit written request for substitution to Architect not later than seven (7) days prior to date bids are due. Architect will consider request and items approved will be listed in an addendum issued to all bidders.
- D. After execution of Contract, substitution of product brands for those named in the Specifications will be considered, only if request is received within thirty (30) days after Contract Date and request includes showing credit due Owner.
- E. Materials specified equivalent and those proposed for substitution must be equal or better than first-named material in construction, efficiency, utility, aesthetic design, and physical size shall not be larger than space provided for it. Request for substitution by full description and technical data in two (2) copies, including manufacturer's name, model, catalog number, photographs or cuts, physical dimensions, operating characteristics, and any other information for comparison.
- F. Owner reserves the right:
 - 1) To require any or all bidders, before execution of Contract, to state what materials they will use.
 - 2) To require "if bound with the Bid Form," the Contractor to fill out a BID SUPPLEMENT listing the BASE BID and "ADD" or "DEDUCT" for other materials he proposes to use.

6. APPROVAL OF SUBCONTRACTORS - MATERIALS

A. The Contractor, if requested, must submit for approval before signing Agreement, list of Subcontractors and material suppliers enumerating items of work to be performed, name of materials, equipment, etc., to be furnished and/or installed. Refer to Paragraph - MATERIALS - EQUIPMENT - SUBSTITUTION.

- B. If the list is not requested prior to signing of Agreement, list, as described in previous paragraph, shall be furnished within ten (10) days of signing Agreement.
- 7. PROTECTION Supplement, ARTICLE 10, AIA GENERAL CONDITIONS A. Refer to Paragraph - WEATHER CONDITIONS.
 - B. Each Contractor shall assume responsibility for his materials stored on the premises.
 - C. General Contractor shall take charge and assume general responsibility for proper protection of project during construction.
 - D. The General Contractor shall protect trees, shrubs, lawns, and all landscape from damage, providing guards and covering. Damaged work shall be repaired or replaced at his expense. Protect streets and sidewalks and make repairs at his expense.
 - 1) Water Protection. The General Contractor shall, at all times, protect the excavation, trenches, and/or the building from damage by rain water, spring water, ground water, backing up of drains or sewers and all other water. He shall provide all pumps and equipment and enclosures to provide this protection.
 - 2) Bracing, Shoring, and Sheeting. The General Contractor shall provide all shoring, bracing and sheeting as required for safety and for the proper execution of the work and have same removed when the work is completed.
 - 3) Guard Lights. The General Contractor shall provide and maintain guard lights at all barricades, railings, obstructions in the streets, roads or sidewalks and at all trenches or pits adjacent to public walks or roads.
 - 4) Weather Conditions. The General Contractor shall, at all times, provide protection against weather; rain, winds, storms, frost, or heat, so as to maintain all work, materials, apparatus, and fixtures, free from injury or damage. At the end of the day's work, all new work likely to be damaged shall be covered.

8. WEATHER CONDITIONS

The Contractor shall protect all portions of his work and all materials, at all times from damage by water, freezing, frost and is to repair, replace and make good to the satisfaction of the Architect, any portion of same which may in the Architect's opinion, have been damaged by the elements.

9. GRADES, LINES, LEVELS, AND SURVEYS

The Owner will establish the lot lines, restrictions and a bench mark. All other grades, lines, levels, and bench marks shall be established and maintained by the General Contractor, who shall be responsible for same. The General Contractor shall verify all grades, lines, levels, and dimensions as shown on the Drawings and he shall report all errors or inconsistencies in the above to the Architect before commencing work.

- A. The General Contractor shall provide and maintain well-built batter boards at all corners. He shall establish bench marks in not less than two (2) widely separated places. As the work progresses, he shall establish bench marks at each floor, giving exact levels of the various floors.
- B. As the work progresses, the General Contractor shall lay out in the forms and the rough flooring the exact location of all partitions as a guide to all trades.
- C. The General Contractor shall verify all grades, lines, levels, and dimensions as shown on the Drawings and he shall report any errors or inconsistencies in the above to the Architect before commencing work.

12. REQUIREMENTS IMMEDIATELY AFTER EXECUTION OF CONTRACT

Immediately after execution of the Contract, the Contractor shall deliver to the Architect the following items which are described more fully in following Articles:

- Schedule of Values Schedule of Operations Progress Charts Samples Superintendent's name and resume of experience List of Subcontractors and Material Suppliers
- A. Schedule of Values on AIA Form G702, or other form approved by the Architect, a detailed breakdown of the Contract Sum indicating the amounts allotted to the various divisions of the work for labor and material. The schedule will serve as a guide to the Architect in determining the amounts due each month as the work progresses. The schedule shall be broken down as directed by the Architect.
- B. Schedule of Operations based on the above Schedule of Values and indicating the progress of the work up to the first day of each month shall be prepared by the Contractor in a form approved by the Architect and shall be delivered to the Architect in duplicate with each application for payment.
- C. Progress Charts based on the above specified schedule of operations and indicating the progress of the work up to the first day of each month shall be prepared by the Contractor in a form approved by the Architect and shall be delivered to the Architect in duplicate with each application for payment. Progress charts shall be in the form of a bar graph. Along with progress charts the Contractor shall provide an estimated monthly cash flow chart.

13. CONSTRUCTION PROCEDURE

- A. Each Contractor shall schedule his work so as to cause a minimum of interference with business operations during all of the construction work.
- B. Precautions and Cooperation
 - 1) Notify the Owner 7 days in advance before any utility (natural gas, water, electricity, or sewer) is to be interrupted.
 - 2) With proper notification, interruption in utilities up to 4 hours will be permitted without special provisions by the Contractor. *If any interruption of a utility exceeds 4 hours the Contractor must make arrangements for temporary alternate utility service.
 - 3) Interruption of utilities must be coordinated with the Owner with changeovers and out of service at night. Weekend and evening changeovers of utilities shall occur with no additional cost to the Owner.
 - 4) Openings to be cut in existing exterior walls must be saw cut. No jackhammer work will be permitted. Notify the Owner 7 days in advance of cutting of exterior walls.

14. TIME EXTENSIONS ADVERSE WEATHER

A. The Contractor shall comply with all provisions of the General Conditions in submitting any request for extension of Contract Time due to unusually severe weather.

B. Definitions:

- 1. <u>Adverse Weather</u> Atmospheric conditions at a definite time and place which are unfavorable to construction activities.
- 2. <u>Unusually Severe Weather</u> Weather which is more severe than the adverse weather anticipated for the season, location, or activity involved.
- C. In order for any request of time extension due to unusually severe weather to be valid, the Contractor must document both of the following conditions.
 - 1. The weather experienced at the project site during the Contract period is more severe that the adverse weather anticipated for the project location during any given month.
 - 2. The unusually severe weather actually caused a delay to the completion of the project. The delay must be beyond the control and without fault or negligence by the Contractor.

D. The following schedule of monthly anticipated adverse weather delays will constitute the baseline for monthly weather time evaluations. The Contractor's Progress Schedule must reflect these anticipated adverse weather delays in all weather-affected activities:
 MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON FIVE (5) DAY WORK WEEK.

JAN	<u>FEB</u>	MAR	APR	MAY	JUN	JUL	AUG	<u>SEP</u>	<u>OCT</u>	NOV	DEC
10	8	7	6	7	7	5	5	5	4	5	9

SPECIAL PROVISIONS

1. GENERAL

Should conflict occur between these Special Provisions and the General Conditions, the requirements of the Special Provisions shall take precedence.

2. TIME OF CONSTRUCTION – PENALTY CLAUSE

- a. <u>Time of Construction</u> The Contractor will commence the work within ten (10) days after the Architect shall have given the Contractor written notice to commence construction to the satisfaction of the Owner within the calendar days as stated in Paragraph 3, below. The time for completion herein set forth shall be extended for the period of any reasonable delay which is due exclusively to causes beyond the control and without the fault of the Contractor, including acts of God, fires, floods, and direction by the Architect. It is impractical to perform any operation of construction and acts of omissions of the Owner with respect to matters for which Owner is solely responsible; provided, however, that no such extension of time for completion shall be granted the Contractor, unless within ten (10) days after the happening of any event relied upon by the Contractor for such extension of time, the Contractor shall have made a request, therefore, in writing to the Architect. Extended time will be submitted with pay request for Owner's approval.
- b. <u>Penalty Clause</u> The time of completion of the construction of the project is of the essence of this Contract. Should the Contractor neglect, refuse, or fail to complete the project (100%) within the time herein agreed upon, after giving effect to extensions of time, if any, herein provided; the Owner shall have the right to deduct from and retain out of such money, which may then be due or which may become due and payable to the Contractor, the sum of FIVE HUNDRED DOLLARS (\$500.00) per day for each and every day that such construction is delayed in its completion beyond the specified time. If the amount due and to become due from the Contractor to the Owner is insufficient to pay in full any such penalites, the Contractor shall pay to the Owner the amount necessary to effect such payment in full; provided, however, that the Owner shall promptly notify the Contractor in writing of the manner in which the amount retained, deducted or claimed. No award is given to the Contractor for early completion.
- c. Joint Responsibility The General Contractor and/or Subcontractors causing the delay in completion of the project shall be responsible for payment of the penalty. In no case shall the total penalty for all contracts exceed the sum of daily penalty multiplied by the number of days of delay in completion.

3 WORK SEQUENCE, SCHEDULE FOR COMPLETION AND LIQUIDATED DAMAGES

a. Schedule requirements for each area are outlined as follows.

		Substantial	
Work	Available Start	Completion	Liquidated Damages
Renovation	On or about May 1, 2024	365 days from Start Date	\$500/Calendar Day

- b. Schedule requirements for final completion 14 days following substantial completion with liquidated damages equivalent to those identified for substantion completion.
- 4. ALTERNATES Refer to Alternate Schedule, Section 01030
 - a. Alternates specified are not a part of Base Bid, but are Alternates to same, their acceptance being at option of Owner.

5. CASH ALLOWANCES

- a. <u>Costs included in Allowances</u>: Cost of Product to Contractor or Subcontractor, less applicable trade discounts, delivery to site, except those taxes saved by use of Owner's tax exemption.
- b. <u>Costs Not Included in the Allowance</u>: Fees for overhead and profit, product handling at the site, including unloading, uncrating, and storage; protection of Products from elements and from damage and labor for installation and finishing.
- c. Architect Responsibilities:
 - 1. Consult with Contractor in consideration and selection of Products, suppliers and installers.
 - 2. Select Products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Proposal Requests and Change Orders.
- d. <u>Contractor Responsibilities</u>:
- 1. Assist Architect/Engineer in selection of Products, suppliers and installers.

- 2. Obtain proposals from suppliers and installers and offer recommendations.
- 3. On notification of selection by Architect, execute purchase agreement with designated supplier and installer.
- 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
- 5. Promptly inspect Products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- 6. Product handling at the site, including unloading, uncrating and storage, protection of Products from elements and from damage and labor for installation and finishing.
- 7. The Contractor shall include in his Bid all fees for all cash allowances.
- e. Funds will be drawn from Cash Allowances only by written authorization from Owner (District).

f. Cash Allowances:

- Inspection and Testing Allowance The contractor shall include in their bid, an allowance of <u>\$10,000.00</u> for direct cost of testing by the approved testing companies. The contractor shall bear all costs associated with coordination, administration scheduling, and supervision of testing companies, and include those costs in their bid.
- 2. Section 09688 Carpet Tile. Carpet Allowance.
 - Walk-Off Carpet Type: This allowance to include purchase and delivery of carpet only. <u>Amount \$45/sq. yard.</u>
 - All other carpet areas: This allowance to include purchase and delievery of carpet only. <u>Amount</u> **\$32/sq. yard.**
- 3. Section 10850 Building Specialties, Interior Building Signage. Amount \$10,000.00
- 4. Contingency Allowance In addition to the specification sections listed above, include an allowance of \$30,000.00 in the general bid and contract amount to be included in the contractors base bid. This allowance shall be used at the sole discretion of the Architect and/or Owner specifically for hidden conditions discovered in the field or on site, the addition of labor, parts and/or materials required for timely completion in conjunction with the general scope of work.
- 5. Ultility Transformer Allowance Include in the base bid an allowance of **\$28,230.00** for the cost of purchasing a utility transformer from the City of Hillsboro Electric Department. This allowance is for the purchase of the utility transformer only.

6. ENUMERATION OF DRAWINGS AND SPECIFICATIONS

- a. <u>Correlation</u>. Accompanying these Specifications are the Drawings, which jointly with these Specifications, are intended to explain each other and describe and coordinate the work to be performed under the Contract.
- b. <u>Verification of Documents</u>. Before submitting his bid, each Bidder shall check his set(s) of Drawings and Specifications and advise the Architect if any sheets are missing.
- c. <u>Specifications Explanations</u>. For convenience of reference, the Specifications are separated into Titled Divisions and Sections. Such separation shall not, however, operate to make the Architect an arbiter to establish limits between the Contractor and Subcontractor or Sub-Subcontractor.
- d. <u>Drawings</u>. Refer to LIST OF DRAWINGS.
- e. <u>Specifications</u>. Refer to TABLE OF CONTENTS.

7. WARRANTIES

Before being eligible for final payment, Contractor shall deliver to Owner, through Architect, all special warranties specified for materials, equipment and installation.

8. OPERATING INSTRUCTIONS

Before being eligible for final payment, Contractor shall deliver to Owner, through Architect, three (3) copies of manufacturer's operating and maintenance instructions, and one (1) CD/DVD containing complete set or manufacturers operating instructions, a complete set of shop drawings on each piece of equipment. Electronic files shall be in PDF format with files organized into single documents for Architectural, Mechanical, and Electrical divisions.

9. AS-BUILT DRAWINGS

Before being eligible for final payment, the Electrical and Mechanical Contractors shall prepare and deliver to Owner, through Architect, One (1) CD/DVD containing AS-BUILT DRAWINGS in PDF format. These drawings shall consist of marked-up prints, and shall show the correct location of every item of equipment, piping, conduit, panel boards, ductwork, switches, valves, etc. If marked-up prints are used, and scanned, they shall be new white prints without miscellaneous markings. All markings shall be clearly legible and identified.

10. CERTIFICATE OF COMPLIANCE

Upon completion of project, Contractor is to furnish written Certification to the Architect that he has complied with every paragraph of the Specifications and Drawings.

- CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS Upon completion of project, Contractor shall submit to Owner a signed Contractor's Affidavit of Release of Liens prior to final payment.
- 12. CONTRACTOR'S MONTHLY APPLICATION FOR PAYMENT FORM Contractor's monthly Application for Payment shall be submitted as per General Conditions. AIA Document G702, Application and Certificate for Payment is approved and acceptable.
- 13. FILING AND RECORDING OF BONDS In addition to furnishing the number of combination Performance Bond and Labor and Materials Payment Bond, and Statutory Bond, if required, the Contractor shall file copies of such bonds with Clerk of the District Court and furnish Architect with receipt furnished by Clerk of the District Court, covering charges for filing and recording of said bonds.

14. STATUTORY BONDS

In addition to furnishing the combination Performance and Labor and Materials Payment Bond specified in General Conditions, the Contractor shall furnish Statutory Bond in an amount not less than 100% of the Agreement in such numbers and form stated in Sample Copy bound in the Specifications. Statutory Bond shall be filed and recorded with Clerk of the District Court, as specified in Paragraph - FILING AND RECORDING OF BONDS.

15. DOCUMENTS FURNISHED CONTRACTORS

The General Contractor will be furnished, free of charge, the following working drawings and specifications, including modifications for construction of the project - 20 sets. The General Contractor will be responsible for distribution of these sets to the Subcontractors and suppliers. The Contractor shall pay the actual cost of reproduction and postage for all additional sets requested by him.

16. TESTING AND INSPECTIONS

- a. The General Contractor shall be responsible for coordination and scheduling of all inspections and testing as required by the Contract documents. The Contractor shall include a testing and inspection allowance in his bid as described in paragraph 5.f.3 of this section. The Contractor shall pay all costs associated with testing and all direct costs from the testing/inspection company and shall be deducted from the testing and inspection allowance. Re-testing/ inspection costs associated with incorrect or defective work shall be paid by the Contractor and such costs are not to be deducted from the allowance.
- b. All sampling and testing procedures shall be performed by the inspection compamy responsible for inspection and testing.

17. SALES TAX EXEMPTIONS

- a. Materials and equipment incorporated into this project <u>are exempt</u> from the payment of sales tax under the laws of the State of Kansas and such sales tax <u>shall not be included in the Bid</u> of the Bidder.
- b. The Owner will provide the Contractor with a proper exemption certificate within twenty (20) days of the Contract date.
 - 1) Should the Owner fail to provide an exemption certificate within the required time period, the Contractor shall be reimbursed monthly for all sales tax amounts for which he becomes liable until such certificate is provided.

2) To minimize the Contractor's record keeping expense, the Owner shall provide an exemption certificate within sixty (60) days or it shall be presumed that the project will proceed on a non-exempt basis, and the Contract amount shall be equitably adjusted in writing in a lump sum amount sufficient to cover the Contractor's sales tax expense.

3) Upon issuance of a proper exemption certificate to the Contractor, the Contractor shall assume full responsibility for his own proper use of the certificate, and shall pay all costs of any legally assessed penalties relating to the Contractor's use of the exemption certificate.

ALTERNATES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 GENERAL

- 1. The General Contractor shall state in his Bid Form the amount of dollars to be ADDED or DEDUCTED from his Base Bid for the following Alternates.
- 2. Alternates are not in order of acceptance.
- 3. It shall be the responsibility of the General Contractor to advise all necessary personnel and suppliers as to the nature and extent of all alternates selected by the owner.
- 4. Circle Add or Deduct to indicate that the alternate price is to be added or subtracted from the base bid.

1.4 DEFINITIONS

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

1.5 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

1. ALTERNATE NO. 1

The Contractor shall state the amount of dollars to be deducted from the Base Bid to include all labor and material associated with **ELIMINATING** the front office area addition. Base bid includes construction of the addition and all associated components. Deduct is to eliminate that addition and components. Deduct alternate plan is identified by B/A2.2. This alternate is independent of Alternate 5.

Deduct \$ _____

Alternates JGR 22-3225RE

4. ALTERNATE NO. 4

3. ALTERNATE NO. 3

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with the replacement of ceiling tiles only in rooms B02, B03, B04, B08, B14, B16, B22, B23, B29, B31, B37, B38, and B42. Existing grid to remain.

Add \$ _____

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with construction and installation of the front reception desk and all associated components.

Add \$

6. ALTERNATE NO. 6

5. ALTERNATE NO. 5

The Contractor shall state the amount of dollars to be added to include all labor and material associated with the installation of Six (6) concrete pads at playground equipment locations. Concrete pads are the base of the cushioned fall zone areas. Locations, configuration, and area as indicated on the Site Plan.

Add \$

7. ALTERNATE NO. 7 The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with installation of the suspended ceiling and adding clouds with Axium trim in rooms 143, 156, and 158, in lieu of the flat ceiling.

Add \$ _____

8. ALTERNATE NO. 8

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated installation of the climbing wall.

Add \$ _____

9. ALTERNATE NO. 9

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with replacing the existing 4" water line at the alley North of the building, from the new domestic and fire line taps, to the west, tying in to existing 6" water line at Floral St.

Add \$ _____

10. ALTERNATE NO. 10 (If added by addendum)

2.	ALTERNATE NO. 2	
<u>∠</u> .	ALTERNATE NO. 2	

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with adding a new concrete parking lot at the east and south of the existing building. This alternate shall include all site work, associated with the parking, south driveway approach, and landscape island as indicated on the drawings.

The Contractor shall state the amount of dollars to be added to the Base Bid to include all labor and material associated with the replacement of ceiling tiles only in rooms B25, B07 & B40. Existing grid to remain.

Add \$

Add \$

Add/Deduct \$ _____

01030-2

UNIT PRICES

PART 1 - GENERAL

1. GENERAL

- A. Work contemplated under various proposed Unit Prices shall include all labor, materials, equipment and services necessary for, or incidental to, completion of all Work under each item.
- B. Unit Prices shall comply with similar conditions of the Drawings and Specifications provided under the Base Bid.
- C. Furnish separate Bids for each Unit Price in the space provided on the Form of Bid stating the amount to ADD to the Base Bid in the event of acceptance.
- D. Each Unit Price proposed shall include all ultimate costs for all omissions, additions, substitutions, and adjustments made by all trades involved.

2. UNIT PRICES

- A. Unit Prices generally will not be considered in determining the lowest responsible Bidder for the Project. However, if the Owner feels the low Bidder has submitted an inordinately high unit price, it may factor in an estimated number of units and calculate the total unit prices. If this is done, the lowest responsible bidder will be determined by comparing the Base Bid, Alternates if any, and the Unit Price calculation.
- B. Unit Prices shall be as listed below:
 - 1. UNIT PRICE NO. 1

Remove unsuitable soil and replace with low volume change material. Existing unsuitable soil shall be excavated and removed from site. New material shall meet the requirements of the geotechnical report. New material shall be placed in lifts as required by the geotechnical report. The Base Bid shall include all removal, replacement, and conditioning as identified by the geotechnical report. The unit pricing is for incidental areas that are not identified, described, or could not be interpreted from the geotechnical investigation.

Add \$_____/C.Y.

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

- A. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- B. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 **PROJECT CONDITIONS**

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section.
- C. Gypsum Board: Minimum 1/2 inch (12.7 mm) thick by 48 inches (1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- E. Paint: Comply with requirements in Division 9 painting Sections.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: As space is available, the contractor may utilize an agreed upon space within the existing building. Area shall be kept neat and orderly.

- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack board.
 - 3. Drinking water.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, selfcontained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filters at air grille in system. Before Substantial Completion, all units and ductwork shall, at contractor's expense, be thoroughly cleaned and <u>restored to</u> <u>new condition. The official start-up date for warranty purposes, shall not begin until such time that the owner takes occupancy of the building and/or Substantial Completion.</u>

2.4 SIGN AND ADVERTISING

- A. The General Contractor shall furnish and erect one (1) painted sign, 4' x 8' in size. Sign shall be mounted on treated wood posts to adequately support sign for duration of construction. Final layout and information shall be as directed by the Grant Facilitator. Sign shall, at minimum, show the following:
 - 1. Name of Project
 - 2. Name, Logo and Address of Architect
 - 3. Name, Logo and Address of General Contractor
 - 4. Name of Mechanical Subcontractor
 - 5. Name of Electrical Subcontractor
- B. Post entire construction area with DANGER and NO TRESPASSING signs to comply with safety and insurance regulations.
- C. Keep premises clear and free from other signs or posters.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

Α.

B.

- C. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Use of Owner's existing electric power service will be permitted, Coordination is required to provide power when new service is installed.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.
 - a. Principal subcontractors' field and home offices.
 - 2. Provide superintendent with cellular telephone for use when away from field office.
- I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail. Cellular e-mail service is acceptable.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines. Comply with NFPA 241.
 - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
 - Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - Protect existing site improvements to remain including curbs, pavement, and utilities.
 Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- E. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
 - 1. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- H. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.
- I. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- J. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

B.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 1 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 2 Section "Site Clearing" and Erosion Control drawings.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 2. Reference erosion control drawings for additional requirement.
- D. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: **Before construction operations begin**, furnish, and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As indicated on Drawings.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. **Provide Owner with one set of keys.**
- H. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - 2. Insulate partitions to provide noise protection to occupied areas.
 - 3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 - 4. Protect air-handling equipment.
 - 5. Weather strip openings.
 - 6. Provide walk-off mats at each entrance through temporary partition.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.
 - 1. Prohibit smoking in completed facilities.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Reference General Conditions.

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
- 1.2 QUALITY ASSURANCE
 - A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
 - B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
 - C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
 - D. Standards: Comply with ANSI A10.6 and NFPA 241.

1.3 PROJECT CONDITIONS

- A. Asbestos Containing Material and Lead Paint have been identified at this project site. Reference the attached Asbestos and Lead Containing Paint Inspection report.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials Asbestos: The Owner is removing asbestos flooring as identified in the report. All material will be removed prior to the start of construction.
 - 1. Contractor shall notify Architect of any issues or concerns prior to performing work on site.
 - 2. Contractor shall perform any prep work to ensure appropriate substrate compatible with the installation of new flooring materials.
- D. Hazardous Materials Lead Paint: It is expected that hazardous materials will be encountered in the Work with required removal of existing drywall partition.
 - 1. Contractor is responsible for safe compliant removal/disposal of hazardous materials including final testing at affected areas to ensure no hazardous particles remain.
 - 2. Contractor is responsible to ensure all areas affected by removal are properly cleaned and lead material is removed or appropriately encapsulated.
- 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- 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. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

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

- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - 2. Protect items from damage during transport and storage.
 - 3. 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 small sections. Cut concrete at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- F. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.
- G. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

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 in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- 3.7 CLEANING
 - A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
SITE CLEARING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Remove surface debris.
- B. Remove paving, curbs, and improvements.
- C. Clear site of plant life and grass.
- D. Remove trees and shrubs.
- E. Remove root system of trees and shrubs.
- F. Topsoil excavation.

1.02 REGULATORY REQUIREMENTS

- A. Conform to applicable local codes and ordinances for disposal of debris, burning debris on site, use of herbicides, etc.
- B. Coordinate clearing Work with utility companies as required.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

3.02 PROTECTION

- A. Locate, identify, and protect utilities that remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect bench marks and existing structures from damage or displacement.

3.03 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove paving, curbs, and improvements designated.
- C. Remove trees and shrubs indicated. Remove stumps, root system surface rock and other areas indicated or implied for completion of the project.
- D. Clear undergrowth and deadwood, without disturbing subsoil. Strip and clear vegetation from areas designated to be filled, excavated, regraded, or landscaped.

3.04 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

3.05 TOPSOIL EXCAVATION

- A. Excavate clean topsoil from areas to be further excavated, filled, re-landscaped, or regraded.
- B. Stockpile in area designated on site to depth not exceeding 8 feet. Protect from erosion. Remove excess topsoil not being reused, from site.

SOIL MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Subsoil and topsoil materials.
- 1.2 RELATED SECTIONS
 - A. Document: N/A

1.3 REFERENCES

- A. ANSI/ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- B. ASTM D2487 Classification of Soils for Engineering Purposes.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Note the Contractor shall excavate as needed to remove gravel pavement as necessary for complete removal and preparation of landscaping. Landscape plantings by owner.
- B. Fill Material: Under slabs and within the zone of influence of foundation elements must be a material approved by the geotechnical engineer and as indicated in the geotechnical report.
- C. Fill and Backfill Material: Other areas, foundation backfill, site grading, and pavement, should be clean site material or similar borrow material, approved by the geotechnical Engineer. Foreign matter shall be limited in size to 1 ¹/₂" in greatest dimension, and be limited to no more than 5% by volume or weight.
- D. Topsoil: Incorporate topsoil into subsoil 3"- 4". Topsoil should be blended and contain the following components by percentage:

Organic Matter:	4 - 6 %
Sand (ASTM - 300 and 75% between .25mm and .75mm):	40 - 50%
Silt:	20 - 25%
Clay:	25 - 40%

2.2 SOURCE QUALITY CONTROL

- A. Inspection and testing will be performed by an independent laboratory, Contractor shall bear all related costs under provisions of General Requirements.
- B. Tests and analysis of soil material will be performed in accordance with ANSI/ASTM D698.
- C. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations indicated or in areas that will not impact project completion.
- B. Stockpile in sufficient quantities to meet project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

ROUGH GRADING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of topsoil and subsoil.
- B. Cutting, grading, filling, and rough contouring the site for site structures, building pads and paving.
- 1.2 RELATED SECTIONS A. Document: N/A
- PART 2 PRODUCTS
- 2.1 MATERIALS
- A. Topsoil, Fill and Structural Fill: As specified in Section 02205.
- PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities. Locate, identify, and protect utilities that remain, from damage. Notify utility company to remove and relocate utilities.
- C. Protect above and below grade utilities that remain.
- D. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Stockpile in area designated on site to depth not exceeding 8 feet. Protect from erosion. Remove subsoil not being reused, from site.
- C. When excavating through roots, perform work by hand and cut roots with sharp axe.

3.4 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill materials on continuous layers and compact in accordance with Schedule at end of Section.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 inches in 10 ft. unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Remove surplus fill materials from site.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the General Requirements.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
- C. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no additional cost to the Owner.

3.7 SCHEDULES

A. Reference Soils Report, 4.2.3 Compaction Requirements Topsoil Fill:

EXCAVATING

PART 1 GENERAL

SECTION INCLUDES 1.1

- Excavating for building foundations and footings. A.
- Excavating for slabs-on-grade, paving, landscaping. B.
- Excavating for site structures and utilities. C.
- 1.2 **RELATED SECTIONS** Document: N/A
 - A.
- PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

- Identify required lines, levels, contours, and datum. A.
- Locate, identify, and protect utilities that remain, from damage. B.
- Notify utility company to remove and relocate utilities. С.
- D. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- E. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

3.2 **EXCAVATION**

- Underpin adjacent structures which may be damaged by excavation work. A.
- Excavate subsoil required to accommodate building foundations, slabs-on-grade, B. paving and site structures, construction operations.
- C. Machine slope banks to angle of repose or less, until shored.
- D. Do not interfere with 45 degree bearing splay of foundation unless shoring has been installed.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Hand trim excavation. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
- H. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- I. Correct areas over-excavated in accordance with Section 02223.
- J. Stockpile excavated material in area designated on site and remove excess material not being reused, from site.
- K. Shoring or Bracing will be required on the north and east wall of the new structure adjacent to the existing building. See the Geotechnical Report for recommendations.

3.3 FIELD OUALITY CONTROL

- Field inspection will be performed under provisions of the General Requirements. A.
- Provide for visual inspection of bearing surfaces. B.

3.4 PROTECTION

- A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

SECTION 02223 BACKFILLING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building perimeter and site structure backfilling to subgrade elevations.
- B. Site filling and backfilling.
- C. Fill under slabs-on-grade, paving.
- D. Consolidation and compaction as scheduled.
- E. Fill for over-excavation.
- 1.2 RELATED SECTIONS
 - A. Document: N/A

1.3 REFERENCES

A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Fill: As specified in Section 02205.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify subdrainage, dampproofing or waterproofing installation has been inspected and completed.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify and proof roll subgrade surface to a depth of 8 to 12 inches to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Fill, Place and compact materials in continuous layers not exceeding 8 inches in compacted depth.
- D. Employ a placement method that does not disturb or damage other work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- F. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- G. Slope grade away from building minimum 2 inches in 10 ft. unless noted otherwise.
- H. Make gradual grade changes. Blend slope into level areas.
- I. Remove surplus backfill materials from site.
- J. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- B. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

- 3.5 FIELD QUALITY CONTROL
 - A. Field inspection and testing will be performed under provisions of the General Requirements.
 - B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
 - C. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no additional cost to the Owner.
 - D. Proof roll compacted fill surfaces under slabs-on-grade, and paving.
- 3.6 **PROTECTION OF FINISHED WORK**
 - A. Protect finished Work under provisions of the General Requirements.
 - B. Reshape and re-compact fills subjected to vehicular traffic.
- 3.7 SCHEDULE
 - A. Interior Slab-On-Grade:
 - 1. Fill compacted to 98 percent of standard Proctor.
 - 2. Cover with Sand Fill 2 inches thick, compacted to 95 percent.
 - B. Exterior Side of Foundation Walls Retaining Walls and Over Granular Filter Material and Foundation Perimeter Drainage:
 - 1. Fill to subgrade elevation, each lift, compacted to 90 percent (minimum) of standard Proctor.
 - C. Fill Under Grass Areas:
 - 1. Fill to 4 inches below finish grade compacted to 90 percent (minimum) of standardProctor.
 - 2. Top soil compacted as recommended to ensure establishment of grass.
 - D. Fill Under Asphalt or Concrete Paving:
 - 1. Compact subsoil to 95 percent of its maximum dry density.
 - E. Fill to Correct Overexcavation:
 - 1. Lean concrete to minimum compressive strength of 1000 psi.
 - 2. Compact approved fill to 95 percent of its maximum dry density.

TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating trenches for utilities from 5 feet outside building to municipal utilities.
- B. Compacted fill from top of utility bedding to subgrade elevations.
- C. Backfilling and compaction.
- 1.02 RELATED SECTIONS
 - A. Document: N/A

1.03 REFERENCES

- A. ANSI/ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- 1.04 FIELD MEASUREMENTS
 - A. Verify that survey bench mark and intended elevations for the Work are as shown on drawings.

1.05 COORDINATION

- A. Coordinate all work as required.
- B. Verify work associated with lower elevation utilities are complete before placing higher elevation utilities.
- PART 2 PRODUCTS
- 2.01 FILL MATERIALS
 - A. Fill: As specified in Section 02205.

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.
- C. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- D. Maintain and protect above and below grade utilities which are to remain.
- E. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with fill and compact to density equal to or greater than requirements for subsequent backfill material.
- 3.02 EXCAVATION
 - A. Excavate subsoil required for utilities to municipal utilities.
 - B. Cut trenches sufficiently wide to enable installation and allow inspection.
 - C. Do not interfere with 45 degree bearing splay of foundations.
 - D. Hand trim excavation. Remove loose matter.
 - E. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume.
 - F. Correct areas over excavated in accordance with Section 02222.
 - G. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.03 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

- C. Granular Fill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
- D. Soil Fill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage foundation perimeter drainage, conduit or pipes in trench.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Install warning tape at all site trenches above all utility piping and conduits.
- G. Remove surplus fill materials from site.
- H. Leave fill material stockpile areas completely free of excess fill materials.
- I. Reference requirements of Mechanical and Electrical specifications and drawings for specific backfill requirements

3.04 TOLERANCES

- A. Top Surface of Backfilling: Plus or minus 1 inch from required elevations.
- 3.05 FIELD QUALITY CONTROL
 - A. Field inspection and testing will be performed under provisions of the General Requirements.
 - B. Compaction testing will be performed in accordance with ANSI/ASTM D698.
 - C. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest at no additional cost to the owner.
- 3.06 PROTECTION OF FINISHED WORK
 - A. Protect or reshape and recompact fills subjected to vehicular traffic during construction.

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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

SUMMARY 1.2

- Section includes temporary excavation support and protection systems. Contractor is responsible for A. all excavation support and protection systems as required by local, state, and OSHA regulations. B. **Related Sections:**
- - Division 1 Section "Temporary Facilities and Controls" for temporary utilities and support 1. facilities.

1.3 PERFORMANCE REQUIREMENTS

- A. Furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 2. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 3. Monitor vibrations, settlements, and movements.
- B. Excavation support and protection must comply with ASHA, state and local requirements.

1.4 OUALITY ASSURANCE

A. Preinstallation:

- Review methods and procedures related to excavation support and protection system including, 1 but not limited to, the following:
 - a. Site conditions, existing buildings, etc.
 - Existing utilities and subsurface conditions. b.
 - c. Proposed excavations.
 - d. Proposed equipment.
 - Monitoring of excavation support and protection system. e.
 - f. Working area location and stability.
 - Coordination with waterproofing. g.
 - ĥ. Abandonment or removal of excavation support and protection system.

1.5 **PROJECT CONDITIONS**

- Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or A. others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
- Project-Site Information: Contractor shall engage a geotechnical testing agency as necessary to B. determine soil conditions and requirements prior to full excavation. Consult with geotechnical engineers regarding necessary safety measures.
 - 1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
 - Geotechnical investigation and safety/protection measures shall be at the contractor's expense. 2.
- C. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - During installation of excavation support and protection systems, regularly resurvey 1. benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.
- B. Shotcrete: Comply with Division 3 Section "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
- C. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

TERMITE CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Soil treatment for termite control below grade, to interior and exterior foundation perimeter.
- B. Kansas Department of Agriculture has issued the attached Fact Sheet regarding Termite Pretreatment Applications. All contractors shall follow the recommendations addressed in the article.

1.2 QUALIFICATIONS

A. Applicator: Company specializing in performing the work of this Section with minimum 5 years documented experience approved by manufacturer, licensed, and approved regulations.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements for application, application licensing, and authority to use toxicant chemicals and in accordance with EPA.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

1.4 SEQUENCING

- A. Apply toxicant 12 hours prior to installation of vapor barrier under slabs-on-grade and finish grading work outside foundations.
- B. Notify Architect 24 hours prior to application.

1.5 WARRANTY

- A. Provide five year warranty under provisions of the General Requirements.
- B. Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Re-treat where required.
- C. Inspect and report annually to Owner in writing. Owner reserves the right to renew warranty for an additional five years.

PART 2 PRODUCTS

- 2.1 MATERIALS
 - A. Kansas Department of Agriculture has issued the attached Fact Sheet regarding Termite Pretreatment Applications. All contractors shall follow the recommendations addressed in this article.
 - B. Toxicant Chemical: EPA and Local authority approved; synthetically color dyed to permit visual identification of treated soil.
 - C. Diluent: Recommended by toxicant manufacturer.
 - D. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify all the site conditions and become familiar with project scope.
 - B. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
 - C. Verify final grading is complete.

3.2 APPLICATION

- A. Spray apply or Inject toxicant in accordance with manufacturer's instructions.
- B. Apply toxicant at locations indicated in Schedule at end of Section.
- C. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- D. Re-treat disturbed treated soil with same toxicant as original treatment. Retreat around building perimeter after top soil has been placed, directly adjacent to foundation wall.
- E. If inspection or testing identifies the presence of termites, re-treat soil and re-test.
- 3.3 PROTECTION OF FINISHED WORK
 - A. Protect finished Work, post signage to warn workers that soil poisoning has been applied.
 - B. Do not permit soil grading over treated work.

3.4 SCHEDULES

- A. Locations: Building Entry Addition
 - 1. Under Slabs-on-Grade including basement floors, porches and stoops.
 - 2. Both Sides of Foundation Surfaces.
 - 3. Soil Within 10 feet of Building Perimeter.



June 2010

Termite Pretreatment Applications

The Kansas Pesticide Law and the Federal Insecticide Fungicide and Rodenticide Act require that pesticide products be applied according to label directions.

Pesticide product labels and the Kansas Pesticide Law state that it is unlawful for any person to use pesticides in a manner that is inconsistent with the pesticide's label instructions.

The Kansas Pesticide Law has additional requirements for termite pretreatment applications. They are outlined in K.A.R. 4-13-26, and state that in addition to label requirements, each preconstruction termite application must include both horizontal and vertical chemical barriers.

What does this mean?

Plainly stated, termite pretreatment applications must include both horizontal and vertical applications at the proper rates to be in compliance with state law.

What is a horizontal chemical barrier?

It is a continuous chemical barrier of termiticide that is applied to the soil beneath slab floors and porches, footing trenches for monolithic slabs and beneath stairs.



Above: After the interior final grade is established, the applicator applies termiticide to the flat surface over which cement will be poured.

What is a vertical chemical barrier?

Vertical chemical barriers must be established in the soil around the base of foundations, plumbing fixtures, foundation walls, support piers and voids in masonry, and any other critical area where structural components extend below grade.



Far left: The applicator completes the interior vertical application before the flat concrete surface is poured.

Left: The exterior vertical application is made after final grading is complete and sometimes after the turf and ornamentals are installed.

Vertical applications may be performed two ways. The applicator may dig a trench according to label directions and apply the termiticide in the trench. Alternatively, the applicator may dig a trench according to label directions and apply termiticide by rodding in the trench to the top of the footing or to a minimum depth of four feet.

What are the types and costs of termiticides?

There are two basic types of soil treatment termiticides offered on the market: repellent and nonrepellent. Repellent termiticides are generally less expensive than nonrepellent termiticides.

When estimating the cost of termiticides for your project, you should consider the cost of the termiticide and how much will need to be applied to follow label directions and state regulations.

Termiticide prices can be divided into three groups. The lowest priced group is repellent termiticides. The middle priced group includes the higher cost repellents and lower cost nonrepellent termiticides. The highest priced group is nonrepellent termiticides.

An easy way to figure the cost of termiticide products in a job estimate is by the cost of a finished gallon of solution to be applied.

Low-cost termiticides are about 40 cents to 60 cents per finished gallon, mid-cost are about \$1 per finished gallon and high-cost are about \$1.65 per finished gallon.

How much should be applied?

You can estimate the amount of horizontal area to be treated for a flat slab building by first determining the size of the slab. For instance, a building that is 60 feet by 100 feet has a 6,000 square feet area to be treated. Most termiticide labels require a minimum of one gallon of finished solution per 10 square feet, so the horizontal application would require 600 gallons of finished solution.

Next, estimate the amount of vertical application volume to be applied. Assume the same 60 foot by 100 foot building has four-foot foundation footings. The vertical application has to be made to the inside and outside of the foundation wall, so the estimated linear feet to be treated are 640.

Using the formula four gallons for every 10 linear feet per foot of depth would give the following amount of termiticide to apply: $4 \ge (640/10) \ge 4$ foot of depth = 1,024 gallons of finished solution for the vertical application.

Combining the gallons of finished solution needed for the horizontal application (600) with the gallons needed for the vertical application (1,024) results in a total 1,624 gallons of finished solution to treat the building according to the label directions and state regulations. The cost of termiticide to treat this building would then be:

- Low-cost termiticide: \$650 to \$974
- Mid-cost termiticide: \$1,624
- High-cost termiticide: \$2,680

These estimates do not include the pest control company's labor, equipment and other operating costs.

What should I look for in a pretreatment bid?

Occasionally a bid is less than the cost of the termiticide needed to properly treat the structure. A reputable company cannot perform the treatment for less than the cost of the pesticide. Seek bids from several firms and make sure all bids are received in writing. You should also:

- get a label for the termiticide to be applied and read it carefully.
- check to make sure that bids received are in compliance with the pesticide label and the Kansas Pesticide Law.
- ask for a written contract that specifies what is to be done, who will do it, the termiticide to be used, the amounts to be used, and how the application will be performed.
- require a warranty and understand what it means to the property owner.

Most termite preconstruction treatments will require several applications at different times during the construction process. To keep your project on schedule and to be sure the termiticide is properly applied:

- notify the pest control company several days ahead of when an application can be made so that it is scheduled with ample time to complete it.
- be present when the termiticide is applied and record the amount of finished termiticide solution used.
- notify the pest control company when the structure and exterior final grade are completed, so the final exterior vertical application is made. This is the first line of defense against termites.

Contact the Kansas Department of Agriculture Pesticide and Fertilizer program at (785) 296-3786 any time you have questions about termite treatment bids or applications.

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Pesticide and Fertilizer Program Kansas Department of Agriculture 109 SW 9th Street, 3rd Floor Topeka, KS 66612 (785) 296-3786

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.1 SECTION INCLUDESA. Concrete sidewalks, parking lot, ramps, stairs, curbs, and curb cuts.

1.2 PERFORMANCE REQUIREMENTS

A. Paving: Designed for parking and light duty commercial vehicles.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, requirements of Sections 03100, 03200 and 03300.
- B. Obtain cementitious materials from same source throughout.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Wood or Steel form material, profiled to suit conditions.
- B. Joint Filler: ANSI/ASTM D1751 type; 3/4 inch thick.

2.2 REINFORCEMENT

- A. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185; 6x6-W2.9 x W2.9 in flat sheets or coiled rolls; unfinished.
- B. Reinforcing Steel: ASTM A615; 40 or 60 ksi yield grade; deformed billet steel bars; unfinished.

2.3 CONCRETE MATERIALS

- A. Cement: ASTM C150 Air Entraining Type IA Portland type, natural color.
- B. Fine and Coarse Mix Aggregates: ASTM C33.
- C. Water: Potable, not detrimental to concrete.
- D. Air Entrainment: ASTM C260.
- E. Chemical Admixture: ASTM C494, as approved by Architect.

2.4 CONCRETE MIX - BY PERFORMANCE CRITERIA

- A. Mix concrete in accordance with, ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Provide concrete to the following criteria:
 - 1. Compressive Strength: Reference schedule below.
 - 2. Slump: 3 to 4 inches.
 - 3. Air Entrained: 5 percent.
- C. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by Architect/Engineer.
- E. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

2.5 SOURCE QUALITY CONTROL

- A. Submit proposed mix design of each class of concrete to the architect and appointed testing laboratory firm for review prior to commencement of work.
- B. Tests on cement and aggregates shall be performed to ensure conformance with specified requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify compacted subgrade, granular base and stabilized soil is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.2 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manholes, catch basins, and frames with oil to prevent bond with concrete pavement.
- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels and reinforcement to achieve pavement and curb alignment as detailed.
- D. Provide doweled joints 12 inch o.c. at interruptions of concrete.

3.5 PLACING CONCRETE

- A. Place concrete in accordance with ACI301.
- B. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.
- C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to indicated pattern.

3.6 JOINTS

- A. Place ¹/₂" inch expansion joints at 60 foot intervals. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/4 inch for sealant placement by Section 07900.
- C. Provide scored or sawn joints at 6 feet intervals U.N.O. at sidewalks and curbs and 150 square feet at all pavement.
- D. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.7 FINISHING

- A. Sidewalk Paving: Light broom, radius to 1/4 inch and trowel joint edges.
- B. Handicapped Ramps: Reference ADA.
- C. Curbs and Gutters: Trowel finish.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- E. Parking: Light Broom.

3.8 FIELD QUALITY CONTROL

- A. Three concrete test cylinders shall be taken for every 100 or less cu yds of each class of concrete placed each day.
- B. One additional test cylinder shall be taken during cold weather and cured on site under same conditions as concrete it represents.
- C. One slump test shall be taken for each set of test cylinders taken.

3.9 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

3.10 SCHEDULES

- A. Concrete sidewalks and integral curb and gutter: 4,000 psi 28 day concrete, 4 inches thick, 6x6 – W1.4 x W1.4 W.W.F. reinforced, natural color Portland cement, broom finish, detectable warnings per ADA at ramps and curb cuts.
- B. Concrete Parking and Drive: 4,000 psi 28 day concrete, 6 inches thick, 6x6 W2.9 x W2.9 W.W.F. reinforced, natural color Portland cement, broom finish.
 - 1. Concrete driveway and parking paving shall be placed over 6" crushed rock or concrete per AB3 standards.

PAVEMENT JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Expansion and contraction joints within cement concrete pavement.
 - 2. Joints between cement concrete and asphalt pavement.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Work.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (4.4 deg C).
 - 3. When joint substrates are wet or covered with frost.
 - 4. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 5. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 COLD-APPLIED JOINT SEALANTS

- A. Single-Component Jet-Fuel-Resistant Urethane Sealant for Concrete: Single-component, pourable, coal-tar-modified, urethane formulation complying with ASTM C 920 for Type S; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
 - 1. Products:
 - a. Sonneborn, Div. of ChemRex, Inc.; Sonomeric 1.
- B. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.
 - 1. Products:
 - a. Crafco Inc.; RoadSaver Silicone.
 - b. Dow Corning Corporation; 888.
- C. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
 - 1. Products:
 - a. Crafco Inc.; RoadSaver Silicone SL.
 - b. Dow Corning Corporation; 890-SL.

2.4 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.5 PRIMERS

A. Primers: Product 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 - 1. 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.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by jointsealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

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 backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of backer materials.
 - 2. Do not stretch, twist, puncture, or tear backer materials.
 - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. 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 provided for each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 **PROTECTION**

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

VINYL FENCE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract apply to this section.

1.02 SUMMARY

- A. <u>This section includes</u> the following:
 - 1. Polyvinyl chloride (PVC) fence and gate components.
 - 2. Gate hardware.
 - 3. Reinforcing steel for concrete-filled, reinforced fence posts.
 - 4. Concrete for post footings and for concrete filled reinforced fence posts.
- B. <u>Related sections:</u> The following sections contain requirements that relate to this section.
 - 1. Section 02200-Earthwork
 - 2. Section 03300-Cast-in-Place concrete

1.03 DEFINITIONS

- A. <u>Posts</u> are the vertical structure support members of the fence.
- B. <u>Rails</u> are the horizontal structural support members of the fence or gate frame.
- C. <u>Pickets</u> are the vertical, non-structural members between bottom and top rails.
- D. <u>Gate Uprights</u> are the vertical structural support members of the gate frame.

1.04 SUBMITTALS

- A. <u>General:</u> Submit the following according to the conditions of the contract.
- B. <u>Product Data:</u> In the form of manufacturer's technical data, specifications, and installations for fence, posts, gate uprights, post caps, gates, gate hardware and accessories.
- C. <u>Samples for verification of PVC color</u> in form of 3-inch lengths of actual product to be used in color selection.
- D. Shop Drawings showing fence design.
- 1.05 QUALITY ASSURANCE
 - A. <u>Installer Qualifications:</u> Engage an experienced installer who has at least three years experience and has completed at least five PVC fence projects with same material and of similar scope to that indicated for this project with a successful construction record of inservice performance.
 - B. <u>Single-Source Responsibility:</u> Obtain PVC fences and gates, including accessories, fittings, and fastenings, from a single source.

1.06 PROJECT CONDITIONS

- A. <u>Field Measurements:</u> Verify layout information for fences and gates shown on the drawings in relation to the property survey and existing structures. Verify dimensions by field measurements.
- 1.07 WARRANTY
 - A. <u>Manufacturer's Warranty:</u> Lifetime non-prorated limited transferable warranty applies to original homeowner/consumer, or 30 year non-prorated limited warranty applies to commercial applications.

PART 2 PRODUCTS

- 2.01 FENCE MATERIALS
 - A. <u>General:</u> Provide PVC fence materials recognized to be of type indicated and tested to show compliance with indicated performances.
 - B. <u>Basis of specification</u>: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include:
 - 1. Bufftech, 231 Ship Canal Parkway, Buffalo, NY 14218 (800) 333-0569
 - 2. Style Name: <u>Reference drawings for style</u>. Height: 4'H minimum.
 - 3. Color Match Bufftech: White only .
 - C. Equivalent products meeting or exceeding specifications may be provided. Bidder responsible to ensure equivalence prior to bidding.

2.02 POLYVINYL CHLORIDE (PVC) FENCE COMPONENTS

- A. <u>General:</u> Posts, rails, pickets, gate uprights, post caps, and accessories shall be of high impact, Ultra Violet (U.V.) resistant, rigid PVC, and shall comply with ASTM D 1784, Class 14344B.
- B. <u>Fence Posts</u>: One piece extruded, of lengths indicated and pre-routed to receive rails at spacing indicated.
 - 1. Cross Section: <u>4" x 4"</u> minimum
 - 2. Wall Thickness: 0.140" minimum
 - 3. Corner Radius: 11/32"R minimum
- C. <u>Rails:</u> One piece extruded, of lengths indicated pre-routed to receive pickets at spacing indicated.
 - 1. Cross Section: <u>1-3/4" X 3-1/2" (Nom 2" X 4")</u> minimum
 - 2. Wall Thickness: 0.100" minimum
 - 3. Corner Radius: <u>13/32"R</u> minimum
- D. Pickets: One piece extruded, of lengths indicated.
 - 1. Cross Section: <u>7/8" X 3"</u> minimum
 - 2. Wall Thickness: <u>0.060</u>" minimum
 - 3. Corner Radius: <u>3/16"R</u> minimum
 - 4. Picket Spacing: 2-7/16".
 - 5. Pickets per 6' section: <u>12 pickets</u>.
- E. <u>Gate Uprights:</u> One piece extruded, of lengths indicated.
 - 1. Cross Section: <u>2 ¹/2</u>" X 4" minimum
 - 2. Wall Thickness: 0.120" minimum
 - 3. Corner Radius: <u>3/16"R</u> minimum
- F. <u>Post Caps:</u> Molded, one piece.
 - 1. Cross Section: Match post or gate upright cross section.
 - 2. Thickness: 0.095" minimum.
 - 3. Configuration: Flat or four-sided as required for installation to top of posts and gate.
- G. <u>Accessories:</u> Manufacturers' standard gate brace, screw caps, rail end reinforcers, and other accessories as required.

2.03 MISCELLANEOUS MATERIALS

- A. Stiffener Channel not required due to heavy wall 2" X 4" rail used and product being set at 6' post centers.
- B. <u>Fasteners and Anchorage:</u> Stainless Steel. All fasteners to be concealed or colored heads to match. Provide sizes as recommended by fence manufacturer.
- C. <u>PVC Cement:</u> As recommended by fence manufacturer.

2.04 GATE HARDWARE AND ACCESSORIES

- A. <u>General:</u> Provide hardware and accessories for each gate according to the following requirements:
- B. <u>Hinges:</u> Size and material to suit gate size, non lift-off type, self closing, glass filled nylon with adjuster plate, offset to permit 120 degree gate opening. Provide one pair of hinges for each gate.
 - 1. Color: Black.
- C. <u>Latch:</u> Manufacturers' standard self latching, glass filled nylon and stainless steel composition single or dual access gravity latch. Provide one latch per gate.
 1. Finish: Match gate hinge finish.
- D. <u>Hardware:</u> Stainless Steel. Provide sizes as recommended by fence manufacturer.
 1. Finish: Match gate hinge finish.

2.05 CONCRETE

- A. <u>Concrete:</u> Provide concrete consisting of portland cement per ASTM C 150, aggregates per ASTM C 33, and potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2000 psi. Use at lease four sacks of cement per cubic yard, 1-inch maximum size aggregate, 3-inch maximum slump. Use ½ inch maximum size aggregate in post where required.
- B. <u>Packages Concrete Mix</u>: Mix dry-packaged normal-weight concrete conforming to ASTM C 387 with clean water to obtain a 2 to 3 inch slump.

2.06 REINFORCEMENT FOR FILLED POSTS

A. <u>Reinforcing Steel:</u>

1. Steel Reinforcing Bars: ASTM A 615. Grade 60. Deformed (#4 or $\frac{1}{2}$ "). Install 2 bars for each post to a length of <u>3-1/2</u>, feet.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Install fence in compliance with manufacturer's written instructions. During installation, PVC components shall be carefully handled and stored to avoid contact with abrasive surfaces. Install components in sequence as recommended by fence manufacturer.
 - 1. Install fencing as indicated on the drawings provided.
 - 2. Variations from the installation indicated must be approved.
 - 3. Variations from the fence and gate installation indicated and all costs for removal and replacement will be the responsibility of the contractor.

3.02 FENCE INSTALLATION

- A. <u>Excavation</u>: Drill or hand-excavate (using post hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
 - 1. If not indicated on drawings, excavate holes for each post to a minimum diameter of $10^{"}$ inches.
 - 2. Unless otherwise indicated, excavate hole depths not less than 30 inches or to frost line.
- B. <u>Posts:</u> Install posts in one piece, plumb and in line. Space a maximum of <u>6</u>' feet o.c. unless otherwise indicated. Enlarge excavation as required to provide clearance indicated between post and side of excavation.

- 1. Protect portion of posts above ground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, terminate top of concrete footings 3 inches below adjacent grade and trowel to a crown to shed water.
 - b. Secure posts in position for manufacturers' recommendations until concrete sets.
 - c. After installation of rails and unless otherwise indicated, install reinforcing in posts in opposing corners of post as shown and fill end and gate posts with concrete to level as indicated. Concrete fill shall completely cover the reinforcing steel and gate hardware fasteners. Consolidate the concrete by striking the post face with a rubber mallet, carefully tamping around the exposed post bottom.
 - d. Install post caps. Use #8 screws, nylon washers and snap caps.
 - e. Remove concrete splatters from PVC fence materials with care to avoid scratching.
- C. <u>Top and Bottom Rails:</u> Install rails in one piece into routed hole fabricated into posts to receive top and bottom rails, and middle where necessary. Except at sloping terrain, install rails level.
 - 1. Prior to installation of rails into posts, insert concealed steel channel stiffeners in top rail, where necessary. Bottom rails shall include minimum (2) ¹/₄" drainage holes.
 - 2. At posts to receive concrete fill, tape rail ends to prevent seepage when filling post with concrete.
- D. <u>Middle Rails</u>: Where necessary, install middle rails in one piece into routed hole in posts with larger holes facing down. Except at sloping terrain, install middle rails level. Secure mid rail to pickets with 2-#8 x 1-1/2" screws evenly spaced.
 - 1. At posts to receive concrete fill, tape rail ends to prevent seepage when filling post with concrete.
- E. <u>Pickets:</u> Install pickets in one piece as per manufacturer recommendations. Install pickets plumb.
- F. <u>Fence Installation at Sloping Terrain</u>: At sloping terrain rails may be racked (sloped) or stepped to comply with manufacturers' recommendations.

3.03 GATE INSTALLATION

- A. Assemble gate per manufacturer's recommendations. Bottom rail shall include minimum (2) ¹/₄" drainage holes.
- B. Assemble gate prior to fence installation to accurately locate hinge and latch post. Align gate horizontal rails with fence horizontal rails.
- C. Install gates plumb, level, and secure for full opening without interference according to manufacturer's instructions.
- D. Gate Latch Installation. Install gate latch according to manufacturer's instructions. Adjust for smooth, trouble-free operation.
- E. Allow minimum 72 hours to let concrete set-up before opening gates.

3.04 ADJUSTING AND CLEANING

A. Remove all traces of dirt and soiled areas.

3.05 DEMONSTRATION

B. Instruct the owner's personnel on proper operation and maintenance of fence components.

PLASTIC COATED CHAIN LINK FENCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Polyolefin coated fence framework, fabric, and accessories.
- B. Concrete anchorage for posts and center drop for gates.
- C. Manual gates and related hardware.

1.02 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in commercial quality chain link fencing with two years experience.
- B. Installation: ANSI/ASTM F567.

1.03 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit shop drawings and product data and samples for approval.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions.

1.04 WARRANTY

A. 15 year complete system warranty protecting against peeling, cracking, blistering, fading, rust, corrosion, etc.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Framework: ASTM F 1043; fused polyolefin 10 mils minimum, over galvanized Schedule 40 steel pipe, standard weight, one piece without joints.
- B. Fabric: polyolefin fused and bonded to zinc coated steel 9 gauge thick (8 gauge finish) per ASTM F668 type 2b. 1 3/4-inch diamond mesh steel wire, interwoven, top selvage twisted tight, bottom selvage knuckle and closed. Fabric will be installed at all sides, fronts, and 'roof'.
- C. Terminal posts: 4-inch diameter standard weight steel pipe (.203 wall thickness), Polyolefin fused.
- D. Line posts: 4-inch diameter standard weight steel pipe (.154 wall thickness), Polyolefin fused.
- E. Top, bottom, and intermediate rail: 1 5/8-inch diameter standard weight steel pipe (.130 wall thickness), Polyolefin fused.
- F. Gate Frame: 3-inch minimum diameter standard weight steel pipe.
- G. Caps: Cast steel or malleable iron, galvanized, polyolefin fused 6 mils minimum, sized to post dimension.
- H. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings: Zinc coated Steel, polyolefin coated 6 mils minimum.
- I. Tension Wire: 6 gauge zinc coated steel, Polyolefin coated
- I. Gate Hardware: For type latch with gravity drop, two 180 degree gate hinges per leaf and hardware for padlock, finish to match fence materials.

2.02 FINISHES

- A. Galvanized: ANSI/ASTM A123; 1.8 oz/sq.ft. coating.
- B. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories, and gates in accordance with ANSI/ASTM F567.
- B. Build fabric panels continuous. Attach end and gate posts to wall with straps. Sleeve post in new concrete foundation or concrete court edge. Install posts, grout around posts. Install all items per recommendations of manufacturer and tennis court contractor.
- C. Provide top, bottom and intermediate rails through line post tops and splice with 7-inch long rail sleeves and "T's" as recommended by manufacturer.
- D. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- E. Install center and bottom brace rail on corner and gate leaves.
- F. Stretch fabric between terminal posts.
- G. Position bottom of fabric 1 inch above finished court surface.
- H. Fasten fabric to top rail, line posts, braces, and bottom tension rail with ties maximum 15 inches on center.
- I. Attach fabric to end, top, corner, and gateposts with tension bars and tension bar clips.
- J. Install gates with fabric to match fence. Install three hinges per leaf, latch, and catches.

CONCRETE FORMWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing, and anchorage.
- B. Openings for other work.
- C. Formaccessories.
- D. Form stripping.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site per the suppliers and/or manufacturer's recommendations.
- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.3 COORDINATION

- A. Coordinate this Section with other Sections of work which require attachment of components to formwork.
- B. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.3 FORMWORK ACCESSORIES

- A. Form Ties: Removable or Snap-off type, metal, size, and shape to minimize filling, waterproofing, and refinishing concrete surfaces.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfer, exposed edges 1/2 inch unless otherwise noted or detailed on the drawings.
- D. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, release tape sealed slots, anchors for securing to concrete formwork.
- E. Flashing Reglets: Galvanized steel 22 gage thick, longest possible lengths, with alignment splines for joints, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- G. Waterstops: Rubber Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections, and heat welded jointing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Earth forms if permitted, hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION – FORMWORK

A. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams joists columns and exposed decorative concrete edges.
- G. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Position recessed reglets for brick veneer masonry anchors to spacing and intervals specified in Section 04300.
- E. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- F. Install waterstops continuous without displacing reinforcement. Heat seal joints watertight.
- G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301. Construct and align formwork for elevator hoistway in accordance with ANSI/ASME A17.1.

3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

CONCRETE REINFORCEMENT

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Reinforcing steel bars, wire fabric, and accessories for cast-in-place concrete.

1.2 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI Manual of Standard Practice ACI 301 Specifications for Structural Concrete for Buildings, and ACI 318 – Building Code Requirements for Reinforced Concrete.
- 1.4 COORDINATION
 - A. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

- 2.1 REINFORCEMENT
 - A. Reinforcing Steel: ASTM A615, 40 or 60 ksi yield grade as indicated on the drawings; deformed billet steel bars, unfinished.
 - B. Reinforcing Steel Plain Bar and Rod Mats: ASTM A704, ASTM A615, Grade 40 or 60 as indicated on the drawings; steel bars or rods, unfinished.
 - C. Welded Steel Wire Fabric: ASTM A815; in flat sheets or coiled rolls; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel type; size and shape as required.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice. Locate reinforcing splices not indicated on drawings, at point of minimum stress.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Maintain concrete cover around reinforcing as indicated on the drawings or if not indicated as follows:

E.	Item	Coverage
	Beams	1 1/2 inch
	Column Ties	1 1/2 inch
W Fo Sl	Walls (exposed to weather or backfill)	2 inch
	Footings and Concrete Formed Against Earth	3 inch
	Slabs on Fill	3/4 inch
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete floors, foundation walls, and footings.
- B. Floors and slabs on grade.
- C. Control, expansion, and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads.

1.2 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data:
 - 1. Provide data on joint devices, attachment accessories.
 - 2. Product data on nonshrink grout.
- C. Samples: Submit 2-inch long samples of expansion/contraction joint.
- D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.
- E. Concrete Mix Design Proportions.
 - 1. Submit as specified in Part 2, Paragraph 2.05 H. Mix Proportions, this section, before placing concrete.
 - 2. Submit for each mix design.
 - 3. Resubmit for any change in mix design.
 - 4. Submit back-up test data for each mix design

1.3 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of embedded utilities and components which are concealed from view.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI301.
- B. Acquire cement and aggregate from same source for all work.
- C. Conform to ACI 305R when concreting during hot weather.
- D. Conform to ACI 306R when concreting during cold weather.

1.5 COORDINATION

A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I Normal or Type III High Early Strength.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean, potable, and not detrimental to concrete.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A Water Reducing, Type B Retarding, Type C Accelerating, Type D Water Reducing and Retarding, Type E Water Reducing and Accelerating.

2.3 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion, polyvinyl acetate, Latex emulsion, two component modified epoxy resin, non-solvent two component polysulfide epoxy, mineral filled polysulfidepolymer epoxy, mineral filled polysulfide polymer epoxy resin, or Polyamid cured epoxy as approved.

- B. Vapor Barrier: 15 mil. thick clear polyethylene film, type recommended for below grade.
- C. Non-Shrink Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- D. Curing Compound: Liquid membrane-forming compound conforming to ASTM C 309, Type 1. Curing compound used on floors to be sealed, painted, tiled, or covered with resilient floor covering shall be guaranteed not to interfere with application of sealers, paint, tile mortar, or tile adhesive after 28-day curing period.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler:
 - Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.
 Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency
- recovery of 95 percent if not compressed more than 50 percent of original thickness.
 B. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric, vinyl, or neoprene, filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum or vinyl cover plate, of longest manufactured length at each location, recess mounted; color as selected.
- C. Sealant: Rubber or synthetic rubber compound.
- 2.5 CONCRETE MIX
 - A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
 - B. Select proportions for normal weight concrete in accordance with ACI 301.
 - C. Provide concrete with compressive strength of 3,500 psi at 28 days.
 - D. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.
 - E. Use calcium chloride only when approved by Architect/Engineer.
 - F. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.
 - G. Add air entraining agent to normal weight concrete mix for work exposed to exterior.
 - H. Mix Proportions.
 - 1. Concrete shall be homogeneous, readily placeable, and uniformly workable; proportioned to conform to ACI 211.1.
 - 2. Mix proportions for all concrete shall be selected preferably on the basis of field experience, but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design. Designs shall conform to ACI 301.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify requirements for concrete cover over reinforcement.
 - B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- 3.2 PREPARATION
 - A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
 - B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
 - C. Use forms for all concrete except footings may be earth formed. Adequately brace and stiffen forms to prevent deflection and settlement.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 304.
- B. Notify Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion, and contraction joints are not disturbed during concrete placement.

- D. Install vapor barrier under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by sealant applied between overlapping edges and ends or taping edges and ends.
- E. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- G. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- I. Install joint devices in accordance with manufacturer's instructions.
- J. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- K. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- L. Install joint covers in longest practical length, when adjacent construction activity is complete.
- M. Apply sealants in joint devices in accordance with Section 07900.
- N. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- O. Place concrete continuously between predetermined expansion, contraction, and construction joints.
- P. Do not interrupt successive placement; do not permit cold joints to occur where possible.
- Q. Place floor slabs in saw cut pattern indicated, not to exceed areas larger than 200 sf. Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur (Usually required 4 to 12 hours after finishing).
- R. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.
- S. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavations.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed concrete walls columns beams joists with smooth rubbed finish.
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. Wood float surfaces which will receive quarry tile, ceramic tile, or terrazzo with full bed setting system.
- D. Steel trowel surfaces, which will receive carpeting, resilient flooring, seamless flooring, thin set quarry tile, or thin set ceramic tile.
- E. Steel trowel surfaces which are scheduled to be exposed.
- F. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/4 inch per foot or as indicated on drawings.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 308.
- D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- F. Curing Compound: Cure with liquid membrane-forming compound conforming to ASTM C 309, Type I. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on. Apply curing compound to all exposed surfaces immediately after removing form or after finishing concrete.

3.6 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of the General Requirements.
- B. Provide free access to Work and cooperate with appointed firm.

- C. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- D. Three 6"x12" or four 4'x8" concrete test cylinders will be taken for every 75 or less cu yds of each class of concrete placed. Test the additional 4"x8" cylinders at 28 days.
- E. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. One slump test will be taken for each set of test cylinders taken.
- G. Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added, the concrete shall be remixed for a minimum of 25 revolutions. Three concrete test cylinders will be taken from every truck that water is added to at the jobsite.

3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections as directed or in accordance with ACI 301.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Steel reinforcing bars.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 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. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 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.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 - 2. Density Classification: Normal weight unless otherwise indicated.

2.3 CONCRETE LINTELS

A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for coldweather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- G. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Mill-galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 5. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
 - 6. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hotdip galvanized-steel wire.
 - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hotdip galvanized-steel wire.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D 2287, 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 D 226/D 226M, Type I (No. 15 asphalt felt).

2.8 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. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type N.
 - 3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 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 C 476, Table 1.
 - 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
 - A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- 3.2 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 (12 mm) or minus 1/4 inch (6 mm).
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
 - 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
 - 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. 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.
- F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 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.
 - 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. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
 - 2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
- 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.

3.6 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 (25 mm) 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 (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.7 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm)

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

- 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- H. Prism Test: For each type of construction provided, according to ASTM C 1314 at seven days and at 28 days.

3.9 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.10 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soilcontaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. 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.

UNIT MASONRY SYSTEM

PART 1 GENERAL

SECTION INCLUDES 1.1

- A. Concrete masonry and brick units.
- Reinforcement, anchorage, and accessories. B.

SUBMITTALS 1.2

- Submit under provisions of the General Requirements. A.
- Product Data: Provide data for masonry and brick units and fabricated wire reinforcement. B.

1.4 **QUALIFICATIONS**

Manufacturer: Company specializing in manufacturing the Products specified in this section A. with minimum three years documented experience.

DELIVERY, STORAGE, AND HANDLING 1.5

- Deliver, store, protect and handle products to site under provisions of the General Requirements. A.
- Accept units on site. Inspect for damage. B.

ENVIRONMENTAL REQUIREMENTS 1.6

- Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, A. and 48 hours after completion of masonry work.
- Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, B. during, and 48 hours after completion of masonry work.
- Hot Cold Weather Requirements: IMIAC Recommended Practices and Guide Specifications C. for Hot or Cold Weather Masonry Construction.

PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

- Hollow Non-Load Bearing Block Units (CMU): All exterior exposed concrete masonry units A. and mortar shall contain integral water repellent. Units shall comply with ASTM C 33 and ASTM C 90, grade N water permanence per ASTM E 514 test. Wind driven protection per ASTM E 514-74, Class E. Full wall flexural bond strength per ASTM E 72-74 all interior concrete masonry shall be grade S, Type I, moisture controlled units.
- B. Size and Shape: Nominal modular size of 4, 6, 8 x 16 x 8 inches.

BRICK UNITS 2.2

- Face Brick: Color to be Selected. New brick to be selected to match existing for patch and A. match finish, and a new brick accents. Contractor submit samples to confirm match.
- B. Size and Shape: Nominal modular size of 4 x 8 x 2 2/3 inches.

2.3 REINFORCEMENT AND ANCHORAGE

- A. Single and Multiple Wythe Joint Reinforcement: Truss type; steel wire, hot dip galvanized to ASTM A641 after fabrication, No. 9 side rods with No. 9 cross ties. Manufacturers:
 - DUR-O-WALL a)
 - b) **TRU-MESH**
 - **BET-R-WALL** c)
- Reinforcing Steel: ASTM A615, 40 or 60 ksi yield grade, deformed billet bars, uncoated finish. B.
- C. Wall Ties: Corrugated wall ties, 22 ga., hot dip galvanized to ASTM A123 steel finish,
 - HB-213 Dur-O-Wall Anchor or Equal.
 - Manufacturers:
 - a) **DUR-O-WALL**
 - TRU-MESH b)
 - **BET-R-WALL** c)

2.4 MORTAR AND GROUT

A. Mortar and Grout: As specified in Section 04100.

2.5 FLASHINGS

- A. Thru-Wall Flashings: Asphalt fabric backed copper, 3-5 oz.
- B. Lap Sealant: Butyl type as specified in Section 07900.

2.6 ACCESSORIES

- A. Preformed Control Joints: Rubber, Neoprene, Polyvinyl chloride material. Provide with corner and tee accessories, heat or cement fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride, polyethylene, polyurethane or rubber; oversized 50 percent to joint width; self-expanding.
- C. Building Paper: TYVEK Commercial wrap.
- D. Nailing Strips: Softwood, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- E. Weeps: Locate at 32" o.c.
- F. Weep Vent: Open weave polyester mesh; insect resistant, hold back from face 1/4".
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.
- H. Cavity wall Mortar Net: 90% open area, 10" H, 1" wide, 18" minimum density PVC or nylon material set behind bottom brick courses between brick and flashing around all exterior veneer walls.

2.7 LINTELS

A. As detailed ondrawings.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field conditions are acceptable and are ready to receive work.
 - B. Verify items provided by other sections of work are properly sized and located.
 - C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running unless otherwise indicated.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave, unless noted otherwise.
- D. Brick Units:
 - 1. Bond: Running, unless noted otherwise.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave, unless noted otherwise.

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, or bitumen damp proofing is applied.
- I. Isolate masonry partitions from vertical structural framing members with a control joint.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.5 WEEPS

A. Install weeps in veneer at 32 inches o.c. horizontally above through-wall flashing, above shelf angles and lintels, at bottom of walls, and under precast concrete window sills. Hold weep screens back from face 1/4 ".

3.6 CAVITY WALL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.
- B. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor barrier adhesive.
- C. Install 10" High x 1" Thick x continuous "Mortar Net" cavity drainage fabric.
- D. Install 90% open weave polyester weep vents at 32" o.c. and at weep locations above windows and doors.

3.7 REINFORCEMENT AND ANCHORAGE

- A. Install horizontal joint reinforcement 16 inches o.c.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place joint reinforcement continuous in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. At masonry veneer, attach wall ties to metal studs at back-up wall at maximum 24 inches o.c. vertically and 16 inches o.c. horizontally. Place at maximum 3 inches o.c. each way around perimeter of openings, and within 12 inches of openings.
 - 1. At top of CMU veneer, field bend and extend galvanized tie minimum 1" into CMU cavity and grout solid. Space at 16" o.c. Provide appropriate length of wall tie to extend into CMU

3.8 MASONRY FLASHINGS

- A. Extend flashings horizontally at foundation walls, above ledge or shelf angles and lintels, under parapet caps, and at bottom of walls.
- B. Turn flashing up minimum 8 inches and bed into mortar joint of masonry, seal to concrete, seal or underlap at sheathing over framed back-up.
- C. Lap end joints minimum 6 inches and seal watertight.
- D. Turn flashing, fold, and seal at corners, bends, and interruptions.

3.9 LINTELS

- A. Install loose steel or precast concrete lintels over openings as indicated or detailed on the Structural.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
- C. Maintain minimum 8 inch bearing on each side of opening.

3.10 GROUTED COMPONENTS

- A. Reinforce bond beam as indicated or detailed.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.11 ENGINEERED MASONRY

- A. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
- B. Place mortar in masonry unit bed joints back 1/4 inch (6 mm) from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 days before placing grout.
- C. Reinforce masonry unit cores and cavities with reinforcement bars and grout as indicated.
- D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Section 03200.
- E. Wet masonry unit surfaces in contact with grout just prior to grout placement.
- F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low lift grouting techniques.
- G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.
- H. Low Lift Grouting: Place first lift of grout to a height of 16 inches to three CMU courses and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.
- I. High Lift Grouting:
 - 1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
 - 2. In double wythe walls, omit every second masonry unit in one of the wythes for clean out and cell inspection purposes.
 - 3. In double wythe walls, construct vertical grout barriers or dams between the masonry wythes, with masonry units every 30 feet maximum.
 - 4. Clean out masonry cells and cavities with high pressure water spray. Permit complete water drainage.
 - 5. Request inspection of the cells and cavities. Allow 3 days advance notice of inspection.
 - 6. After cleaning and cell inspection, seal openings with masonry units.
 - 7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation.
 - 8. Limit grout lift to 60 inches and rod for grout consolidation or mechanically vibrate. Wait 60 minutes before placing next lift.

3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joint in accordance with Section 07900 for sealant performance.
- E. Form expansion joint as detailed.

3.13 BUILT-IN WORK

- A. As work progresses, install built-in metal door and glazed frames, fabricated metal frames, window frames, wood nailing strips, fireplace accessories, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.
- B. Install built-in items plumb and level.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build in organic materials subject to deterioration.
- 3.14 TOLERANCES
 - A. Maximum Variation From Alignment of Columns: 1/4 inch.
 - B. Maximum Variation From Unit to Adjacent Unit: 1/32 inch.
 - C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
 - D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- 3.15 CUTTING AND FITTING
 - A. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
 - B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.
- 3.16 MOCK-UP
 - A. Provide a 4 ft. by 4 ft. mock-up panel on the job site to be used as a standard for similar masonry construction on the project.

3.17 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.18 **PROTECTION OF FINISHED WORK**

- A. Protect finished Work.
- B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1. Framing with dimension lumber.
- 2. Framing with engineered wood products.
- 3. Shear wall panels.
- 4. Wood blocking and nailers.
- 5. Wood furring and grounds.
- 6. Wood sleepers.
- 7. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: 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. Evaluation 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.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant 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.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, 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. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

- 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, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- 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. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or 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.
- 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-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- Non-Load-Bearing Interior Partitions: As indicated on the structural drawings.
 - 1. Application: Refer to structural drawings.
 - 2. Species:

A.

- a. Southern pine or mixed southern pine; SPIB.
- b. Northern species; NLGA.
- c. Eastern softwoods; NeLMA.
- d. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Partitions: As indicated on the structural drawings.
 - 1. Application: Refer to structural drawings.
 - 2. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch (north); NLGA.

2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi
 - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi
- B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: 2900 psi.
 - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi for members with 18" depths or less and 2,200,000 psi for members with depths greater than 18".
- C. Laminated-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
- D. Rim Boards: Product designed to be used as a load-bearing member and to brace wood joists at bearing ends.
 - 1. Material: made from solid lumber or laminated-strand lumber.
 - 2. Thickness: 1-1/4 inches.
 - 3. Provide performance-rated product complying with APA PRR-401, rim board, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Furring.
 - 4. Grounds.
- B. For items of dimension lumber size, provide stud grade lumber or better of any of the following species:
 - 1. Southern pine; SPIB.
 - 2. Douglas fir-larch; WCLIB or WWPA.

- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 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 of Type 304 stainless steel.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Nails, Brads, and Staples: ASTM F 1667.
- D. Power-Driven Fasteners: NES NER-272.
- E. Wood Screws: ASME B18.6.1.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.8 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Simpson Strong-Tie Co., Inc.
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall 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. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

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. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry 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.
- 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. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- I. 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.

3.2 **PROTECTION**

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

WOOD BLOCKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Blocking in wall and roof openings.
- B. Wood furring and grounds.
- C. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, and wood trim.
- D. Telephone and electrical panel boards.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Miscellaneous Blocking: Minimum stud grade.
- B. Plywood: APA Rated Sheathing, Grade C-D; Exposure Durability 1; sanded.
- C. Roof Curbs and Cants: Treated lumber.

2.2 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - 2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorages to steel.

PART 3 EXECUTION

3.1 FRAMING

- A. Set members level and plumb, in correct position.
- B. Place horizontal members flat, crown side up.
- C. Construct curb members of single pieces.
- D. Space framing and furring 16 inches o.c.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinate curb installation with installation of decking and support of deck openings, roofing vapor retardant, and parapet construction.

3.2 SHEATHING

- A. Secure sheathing to framing members with ends over firm bearing and staggered.
- B. Install telephone and electrical panel boards with plywood sheathing material where required. Over size the panel by 12 inches on all sides.

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Roof sheathing.
 - 3. Sheathing joint and penetration treatment.
- 1.2 ACTION SUBMITTALS
 - A. Product Data: For each type of process and factory-fabricated product.
- 1.3 INFORMATIONAL SUBMITTALS
 - A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119; 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. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 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.
- 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 according to ASTM E 84, 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 (3.2 m) beyond the centerline of the burners at any time during the test.

- 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.
- 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall 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 (76 deg C) shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.
- 2.5 WALL SHEATHING
 - A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I, Exposure 1 sheathing.
 - B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I sheathing.
 - C. Zip Panel Sheathing, complete with joint tape and sealants as recommended by manufacturer for Air Barriers.
- 2.6 ROOF SHEATHING
 - A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior, Structural I, Exposure 1 sheathing.
 - B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural sheathing.
- 2.7 FASTENERS
 - A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof, parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for 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."
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
- C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 or ASTM D 3498 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:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 CEMENTITIOUS BACKER UNIT INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood girder trusses.
 - 3. Wood truss bracing.
 - 4. Metal truss accessories.

1.2 DEFINITIONS

A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plateconnected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

- A. 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.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- B. Delegated-Design Submittal: 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.

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. Wood-preservative-treated lumber.
 - 2. Fire-retardant-treated wood.
 - 3. Metal-plate connectors.
 - 4. 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 that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Structural Engineer and authorities having jurisdiction.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fireretardant 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI 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 to design metal-plate-connected wood trusses. Shop drawings, plan placement drawings, and structural analysis data shall be signed and sealed by the qualified professional engineer responsible for their preparation. Engineer shall be licensed in the state of Missouri.
- B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection Under Design Loads:
 - a. Roof Trusses: Refer to structural drawings.
- C. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its' "Supplement."

2.2 DIMENSION LUMBER

- A. Certified Wood: For metal-plate-connected wood trusses and permanent bracing, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

- 1. Factory mark each piece of lumber with grade stamp of grading agency.
- 2. For exposed lumber indicated to receive a stained or natural finish, 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.
- C. Minimum Chord Size for Roof Trusses: Refer to the structural drawings.
- D. Minimum Specific Gravity for Top Chords: Refer to the structural drawings.
- E. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed trusses indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat all trusses unless otherwise indicated.

2.4 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 Engineered Products, Inc.; an ITW company.
 - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
 - 3. CompuTrus, Inc.
 - 4. Eagle Metal Products.
 - 5. Jager Building Systems, Inc.; a Tembec/SGF Rexfor company.
 - 6. MiTek Industries, Inc.; a subsidiary of Berkshire Hathaway Inc.
 - 7. Robbins Engineering, Inc.
 - 8. Truswal Systems Corporation; an ITW company.
- B. Source Limitations: Obtain metal connector plates from single manufacturer.
- C. General: Fabricate connector plates to comply with TPI 1.
- D. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; 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 (Z180) coating designation; and not less than 0.036 inch thick.
 - 1. Use for interior locations unless otherwise indicated.
- E. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.5 FASTENERS

A. General: 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 A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.6 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: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip Heavy-Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), highstrength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inches thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick.
- F. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.
- G. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below, 2-1/2 inches wide by 0.062 inch thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.
- H. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, 1-1/4 inches wide by 0.050 inch thick. Clip is fastened to truss through slotted holes to allow for truss deflection.
- I. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.
- B. Protective Coatings: SSPC-Paint 22, epoxy-polyamide primer or SSPC-Paint 16, coal-tar epoxy-polyamide paint.

2.8 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.

2.9 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate does not comply with the Contract Documents.

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.
- 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 on the structural drawings; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. 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."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- L. Replace wood trusses that are damaged or do not meet 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 the Structural Engineer.

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 with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- D. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
 - 1. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

FINISH CARPENTRY

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Finish carpentry items, other than shop prefabricated casework.
 - B. Hardware and attachment accessories.
- 1.2 QUALITY ASSURANCE
 - A. Perform work in accordance with AWI Custom.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Protect work from moisture damage.
- 1.4 FIELD MEASUREMENTS
 - A. Verify that field measurements are as indicated on shop drawings and as instructed by the manufacturer.

1.5 COORDINATION

A. Coordinate the work with plumbing and electrical rough-in, and installation of associated and adjacent components.

PART 2 PRODUCTS

- 2.1 LUMBER MATERIALS
 - A. Softwood Lumber: Graded in accordance with AWI Custom; Reference schedule at the end of this section; <u>Select Soft White Maple</u>, maximum moisture content of 6 percent; suitable for transparent finish.
 - B. Paint Grade Lumber: Graded in accordance with AWI Custom; Reference schedule at the end of this section; **Paint Grade Poplar.** Free of visible grain and knots.

2.2 SHEET MATERIALS

- A. Exterior Plywood: Exposed to weather shall be group 1, Exterior type, Grade A-B or A-C as required for exposure.
- B. Interior Plywood: Interior or Exterior type, Group 1 or 2, Grade B-D where concealed, Grade A-C one side exposed and Grade A-A two sides exposed.
- C. Wood Particleboard: ANSI A208.1 Type 1; AWI standard, composed of wood chips, medium density, made with high waterproof resin binders; of grade to suit application; sanded faces.
- D. Exterior Hardie Panel; fiber cement panels.

2.3 FASTENERS

A. Fasteners: Of size and type to suit application; Galvanized finish in concealed locations and Brass or Chrome finish in exposed locations.

2.4 FABRICATION

- A. Fabricate to AWI Custom standards.
- B. Shop assemble work for delivery to site, permitting passage through building openings.
- C. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
2.5 SHOP FINISHING

- E. Sand work smooth and set exposed nails and screws.
- F. Apply wood filler in exposed nail and screw indentations.
- G. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- H. Seal, stain, and varnish exposed to view surfaces. Brush apply only.
 - 1. Prime paint. Seal surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.
- 3.2 INSTALLATION
 - A. Install work in accordance with AWI Custom Quality Standard.
 - B. Set and secure materials and components in place, plumb, and level.
 - C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
 - D. Install components trim with nails, screws, bolts with blind fasteners or wall adhesive by gun application.
 - E. Install hardware in accordance with manufacturer's instructions.

3.3 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply two coats of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

3.4 PREPARATION FOR SITE FINISHING

- A. Site Finishing: Refer to Section 09900.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

CUSTOM CASEWORK

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Countertops, base and wall cabinets.
 - B. Cabinet hardware.
 - C. Prefinished surfaces and preparation for site finishing.
 - D. Preparation for installing utilities.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes.
- 1.3 QUALIFICATIONS
 - A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years' documented experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products to site.
- B. Protect units from moisture damage.

1.5 FIELD MEASUREMENTS

A. Verify that field measurements are as on shop drawings.

1.6 COORDINATION

A. Coordinate the work with plumbing and electrical rough-in.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Salina Planning Mill.
- B. Crestwood Inc.
- C. Technique Manufacturing
- D. Woodwork Manufacturing and Supply
- E. Highland Mill Shop
- F. Substitutions: Under provisions of the General Requirements.

2.2 WOOD MATERIALS

- A. Softwood Lumber: FS MM-L-736; graded in accordance with AWI Premium Grade; average moisture content of 6 percent; species and grade as follows: Soft White Maple, to match. Edging & trim where indicated and detailed.
- 2.3 SHEET MATERIALS
 - A. Hardwood Plywood: S 51; graded in accordance with AWI, core materials of veneer, and lumber, type of glue recommended for application; face veneer and cuts as follows:

ITEM	FACE SPECIES
Drawer 'Box' Construction	Melamine (unless noted otherwise) - Per AWI Premium Grade.
Door Construction	Plastic Laminate (u.n.o.) - Per AWI Premium Grade.
Cabinet 'Body' Construction	Plastic Laminate at exposed (u.n.o.). Melamine at unexposed
	(u.n.o.) - Per AWI Premium Grade.
Backs	Plastic Laminate at exposed (u.n.o.). Melamine at unexposed
	(u.n.o.) - Per AWI Premium Grade.
Shelving	Melamine (u.n.o.) - Per AWI Premium Grade.

(Note: Melamine Cabinet interiors to be "white".

- B. High Performance particleboardCore:
 - 1. Particleboard to be ³/₄" thick of 45 lb. Density, and balanced construction withmoisture Content not to exceed 8%. All particleboards shall meet or exceed the requirements for its type and classification under Commercial Standard CS-236-66, Federal Specifications LLL-B-800A, and ASTM D 1037-78.
 - 2. Particleboard shall meet the following performance requirements. Submit compliance data from the manufacturer prior to fabrication:

Screw Holding, Face	471 lbs.
Modulus of Rupture	2,400 psi.
Modulus of Elasticity	450,000 psi
Internal Bond	90 psi.
Surface Hardness	900 lbs.
	10

C. Hardboard: Hardboard shall meet or exceed Commercial Standards CS-251 and Federal Specifications LLL-B-00810. Tempered hardboard ¹/₄" thick, smooth both sides.

2.4 MANUFACTURERS - PLASTIC LAMINATE

A. Wilsonart, Formica, Pionite or Nevamar. Colors to be Selected (Full Line of all manufacturers **including premium grade**)

2.5 SOLID SURFACE MATERIALS

A. LG Solid Surface

B.

- 1. $\frac{3}{4}$ " or 1" standard thickness with 1-1/2" thick eased edges.
- 2. Color to be selected from full line of manufacturer's colors, price category (D) and below.
- Equivalent product by Corian color to be selected including all colors to price category 5.
- C. Restroom vanity tops to be provided with integral lavatory sinks. Style equal to LG Single Sink 1612 Oval style sink, ADA compliant.

2.6 LAMINATE MATERIALS

- A. Plastic Laminate: AWI, 0.040 inch Post Forming 0.050 inch General Purpose quality; color, pattern, and surface texture as selected.
- B. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

2.7 ACCESSORIES

- A. Adhesive: FS MMM-A-130 contact adhesive, type recommended by AWI and laminate manufacturer to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; approved finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. PVC Edge Band: 3mm Color and Pattern matched to plastic laminated face. Typical at all doors, drawers, and open cabinet edges.

2.8 HARDWARE

- A. Hinges: Grass #3803 120° nickel finish.
- B. Pulls: Hafele, Amerock Allison, satin nickel, item no. 133.50.160
- C. Drawer Slides: Hafele, Accuride #3832SC.
- D. Adjustable shelf clips: Knape & Vogt, 3256 zinc finish.
- E. Cushion Bumpers: Hafele #356.21.428 clear. Two on each door & drawer.
- F. "Recessed" Adjustable shelf standards: Knape & Vogt, #255, zinc finish.
- G. Grommets: Hafele, Series #429, full range colors. Quantity (22). Locate per shop drawings review.
- H. Catches: Amerock, #9783 magnetic.
- 2.9 FINISHING MATERIALS
 - A. Stain, Varnish and Finishing Materials: As specified in Section 09900.

2.10 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fit shelves, doors, and exposed edges with .3mm pvc. Pattern and color match to laminate cabinets. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. Door and Drawer Fronts: 3/4 inch thick; overlay style.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arrises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- H. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal contact surfaces of cut edges.

2.11 FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler, which matches surrounding surfaces and of types recommended for applied finishes.
- D. Seal, stain, and varnish exposed to view surfaces.
- E. Seal, stain, and varnish internal exposed to view and semi-concealed surfaces. Seal surfaces in contact with cementitious materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify adequacy of backing and support framing.

3.2 INSTALLATION

- A. Set and secure casework in place; rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.5 SCHEDULE

A. Adjustable shelving longer than 34" to be 1" thick.

BOARD INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Adhesive, sheet vapor and air barrier.
- B. Board insulation, Roofing, EPS & XPS.
- C. Board insulation at Brick Cavity walls.

1.2 REFERENCES

- A. ANSI/ASTM D2842 Water Absorption of Rigid Cellular Plastics.
- B. ASTM C578 Preformed Cellular Polystyrene Thermal Insulation.
- C. ASTM E96 Test Methods for Water Vapor Transmission of Materials.

1.3 PERFORMANCE REQUIREMENTS

- A. Materials of this Section shall provide continuity of thermal barrier at building enclosure elements.
- B. Materials of this Section shall provide continuity of vapor and air barrier at building enclosure elements.
- 1.4 SUBMITTALS
 - A. Product Data: Provide data on product characteristics, performance criteria, limitations.
 - B. Manufacturer's Installation Instructions: Indicate special environmental conditions required for installation, installation techniques.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

- A. Dow, & Dyplast Products
- B. Substitutions: Under provisions of the General Requirements.

2.2 ADHESIVES

A. Adhesive: Type recommended by insulation manufacturer for application.

2.3 ACCESSORIES

- A. Tape: Polyethylene polyester self-adhering type, mesh reinforced, 2 inch wide.
- B. Insulation Fasteners: Impale clip of galvanized steel, to be mechanically fastened to surface to receive board insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

2.4 ROOF INSULATION

A.	Insulation, Roof: Polyisocyanurate, Flat and Tapered type		
	Insulation Board Size:	Maximum 48 x 96 inch	
	Board Thickness:	1 inch min. thickness Tapered	
	Density:	.90-1.14 lb/ft3	
	Thermal Resistance:	5.7 minimum R value per inch	
	Board Edges:	Square	
	Water Absorption:	ASTM C272, less than 4% volume	
	-		

B. Insulation Below Grade: Dow Products, Cavitymate, Extruded Polystyrene

Board Size:Maximum 16 x 96 inchBoard Thickness:2" min., ref drawings as indicatedDensity:D1621, 15 psi min.Thermal Resistance:10 minimum Rvalue per inch Board Edges:Butt EdgeWater Absorption:D2842, less than 0.7 %

C. Insulation Wall Cavity: **Dow Products, Cavitymate, Extruded Polystyrene**

Board Size:Maximum 16 x 96 inchBoard Thickness:1.5" min., ref drawings as indicatedDensity:D1621, 15 psi min.Thermal Resistance:7 minimum Rvalue per inch Board Edges:Butt EdgeWater Absorption:D2842, less than 0.7 %volumeVolume

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify site conditions.
 - B. Verify that substrate, adjacent materials, and insulation boards are dry and ready to receive insulation.
 - C. Verify substrate surface is flat, free of honeycomb fin irregularities, materials or substances that may impede adhesive bond.

3.2 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
- B. Do not permit Work to be damaged prior to covering insulation.

BATT INSULATION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Batt insulation at exterior wall and roof locations.
 - B. Batt insulation for filling perimeter window and door shim spaces, crevices in exterior wall and roof.
 - C. Sound batt insulation at interior walls.
 - D. Vapor retarder.

1.2 REFERENCES

- A. ASTM C665 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- B. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.

1.3 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure in conjunction with thermal insulating materials in Section 07212. Overlap insulations to ensure complete thermal envelope at all exterior surfaces.
- 1.4 COORDINATION
 - A. Coordinate the work with all related Sections for installation of vapor retarder and other forms of insulation.

PART 2 PRODUCTS

2.1 MANUFACTURERS - INSULATION MATERIALS

- A. OWENS-CORNING FIBERGLASS Product thermal batt insulation. Class A rated.
- B. Substitutions: Under provisions of the General Requirements.
- 2.2 MATERIALS
 - A. Batt Insulation: ASTM C665; preformed glass fiber batts; loose laid and taped, conforming to the following:
 - 1. Thermal Resistance: R-19 at walls.
 - 2. Batt Size: 6" and 8" per exterior wall thickness.
 - 3. Facing: Foil
 - Sound Batt Insulation:
 - 1. Batt size: 3" and 6".
 - 2. Facing: Unfaced.
 - C. Tape: Self-adhering type as recommended by the manufacturer, mesh reinforced, 2 inches wide.

PART 3 EXECUTION

B.

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify that substrate, adjacent materials, and insulation are dry and ready to be installed.
- 3.2 INSTALLATION
 - A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
 - B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
 - C. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
 - D. Install with applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane, caulk, or tape.
 - E. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Asphalt shingles.
 - 2. Felt underlayment.
 - 3. Self-adhering sheet underlayment.
 - 4. Ridge vents.
- B. Shingle systems to be provided at areas to be patched to accommodate new equipment, curbs, pipe penetrations, and tie-ins. Otherwise, existing shingle roofs are to remain.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.
- B. Source Limitations: Obtain ridge and hip cap shingles ridge vents, felt underlayment, and self-adhering sheet underlayment through one source from a single asphalt shingle manufacturer.
- C. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the firetest-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: **Class C or better**; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.6 WARRANTY

- A. Special Project Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by roofing Installer, covering Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within the following warranty period:
 - 1. Installation Warranty Period: Two years from date of Substantial Completion.
 - 2. Product Warranty Period: Thirty year product warranty.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 100 sq. ft (9.3 sq. m) of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Products and Installation; Roof System and Materials to be provided and installed to be Exterior Fire-Test Exposure Class B or better; ASTM E 108 or UL 790.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: Class A, ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing. GAF – Timberline 30 or approved equal, Minimum 30 year Material Warranty.

1. Butt Edge: Straight or Notched cut.

- Strip Size: Manufacturer's standard.
- 3. Algae Resistance: Granules treated to resist algae discoloration.
- 4. Color, Blend, and Style to match existing.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

- A. Felts: ASTM D 4869, Type I, asphalt-saturated organic felts, non-perforated.
- B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil- thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied

2.4 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard rigid section high-density polypropylene or other UVstabilized plastic ridge vent with nonwoven geotextile filter strips and with external deflector baffles; for use under ridge shingles.

2.5 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.

2.6 METAL FLASHING AND TRIM

- A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Zinc-coated (galvanized) steel or Prepainted, metallic-coated steel.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.
 - 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches (100 mm) over and 4 inches (100 mm) beyond each side of down slope asphalt shingles and 6 inches (150 mm)] up the vertical surface.

- 2. Step Flashings: Fabricate with a headlap of 2 inches (50 mm) and a minimum extension of 4 inches (100 mm) over the underlying asphalt shingle and up the vertical surface.
- 3. Cricket Flashings: Fabricate with concealed flange extending a minimum of 18 inches (450 mm) beneath upslope asphalt shingles and 6 inches (150 mm) beyond each side of chimney, skylight, and 6 inches (150 mm) above the roof plane.
- 4. Open Valley Flashings: Fabricate in lengths not exceeding 10 feet (3 m) with 1-inch- (25-mm-) high inverted-V profile at center of valley and equal flange widths of 12 inches (300 mm).
- 5. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with 2-inch (50-mm) roof deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches (100 mm) from pipe onto roof.

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 work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
 - 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Double-Layer Felt Underlayment: Install double layers of felt underlayment on roof deck perpendicular to roof slope in parallel courses. Install a 19-inch- (485-mm-) wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches (485 mm) in shingle fashion. Lap ends a minimum of 6 inches (150 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt underlayment roofing nails.
 - 1. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed.
 - 2. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water.
 - 3. Terminate felt underlayment extended up not less than 4 inches (100 mm)] against sidewalls, curbs, chimneys and other roof projections.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - Eaves: Extend from edges of eaves 24 inches (600 mm) beyond interior face of exterior wall. Rakes: Extend from edges of rake 24 inches (600 mm) beyond interior face of exterior wall. Valleys: Extend from lowest to highest point 18 inches (450 mm) on each side. Hips: Extend 18 inches (450 mm on each side. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot.
 - 3. Sidewalls: Extend beyond sidewall 18 inches (450 mm) and return vertically against sidewall not less than 4 inches (100 mm).
 - 4. Dormers, Chimneys, Skylights, and other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches (450 mm) and return vertically against penetrating element not less than 4 inches (100 mm).
 - 5. Roof Slope Transitions: Extend 18 inches (450 mm) on each roof slope.

- C. Metal-Flashed Open Valley Underlayment: Install two layers of 36-inch- (914-mm-) wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches (1830 mm). Lap ends of each layer at least 12 inches (300 mm) in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment roofing nails.
 - 1. Lap roof deck felt underlayment over first layer of valley felt underlayment at least 6 inches (150 mm).

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
 - 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a head lap of 2 inches (50 mm) and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- D. Cricket or Backer Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
- E. Open Valley Flashings: Install centrally in valleys, lapping ends at least 8 inches (200 mm) in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - 1. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.
 - 2. Adhere 9-inch- (225-mm-) wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
- F. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- G. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- H. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch (13 mm) over fascia at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- F. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
 - 1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots.
 - 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - 3. When ambient temperature during installation is below 50 deg F (10 deg C), seal asphalt shingles with asphalt roofing cement spots.
- G. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.
 - 1. Set valley edge of asphalt shingles in a 3-inch- (75-mm-) wide bed of asphalt roofing cement.
 - 2. Do not nail asphalt shingles to metal open valley flashings.
- H. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

I. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

SIDING

PART 1 - GENERAL

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Siding.
 - a. Hardie Horizontal Lap Siding Panels
 - b. Hardie Siding Shingles, Staggered Edge
 - 2. Trim & decorative accessories.
 - a. Hardie Trim
 - b. Other custom as indicated on the drawings
- 1.3 SUBMITTALS
 - A. Product Data: For each type of product indicated.
 - B. Samples for Initial Selection: For siding, soffit, and decorative accessories.
- 1.4 QUALITY ASSURANCE
- A. Source Limitations for Siding and Soffit: Obtain [each type, color, texture, and pattern of] siding and soffit, including related accessories, through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weathertight place.

1.6 **PROJECT CONDITIONS**

A. Weather Limitations: Proceed with siding installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed according to manufacturer's written instructions.

1.7 SEQUENCING

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace siding that does not comply with requirements or that fails within specified warranty period. Failures include, but are not limited to, cracking, deforming, fading, or otherwise deteriorating beyond normal weathering.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of siding and trim in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

- 2. Products: Subject to compliance with requirements, provide one of the products specified.
- 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
- 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
- 5. Basis-of-Design Product: The design for each siding and soffit is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 CEMENT SIDING A. Fiber-Cement Siding

Fiber-Cement Siding: Submit manufacturer information for approval. Provide sizes and shapes as indicated or illustrated on the Exterior Elevations, Walls Sections or Details.

- 1. Design is based on James Hardie Fiber-Cement;
 - a. James Hardie Shingles, Staggered Edge, exposure 6", 15.25" w x 0.25 t
 - b. James Hardie Lap Siding, Spaced 6" O.C., Smooth Grain,
 - c. James Hardie Trim, Size and shape varies, Ref Plans.

2.3 ACCESSORIES

- A. Siding Accessories: Provide starter strips, edge trim, corner cap, and other items as recommended by siding manufacturer for building configuration.
 - 1. Provide accessories made from same material as adjacent siding, unless otherwise indicated.
 - 2. Provide accessories matching color and texture of adjacent siding, unless otherwise indicated.
- B. Decorative Accessories: Provide the following types of decorative accessories as indicated:
 - 1. Corner posts with fluted faces.
 - 2. Door and window casings.
 - 3. Entrance and window head pediments.
 - 4. Moldings and trim.
- C. Flashing: Provide aluminum flashing complying with Division 7 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- D. Building Paper: TYVEK Commercial Wrap or equivalent material. Tape and lap joints. Tape joints where patching to existing.
- E. Elastomeric Joint Sealant: joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

F. Fasteners:

- 1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
- 2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm) or 3 screw-threads into substrate.
- 3. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
- 4. For fastening fiber-cement siding, use hot-dip galvanized fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Overlap joints to shed water away from direction of prevailing wind.

B. Isolate dissimilar metals by separating with rubber gaskets or elastomeric sealant. Use rubber washers where fasteners made from dissimilar metal penetrate siding. Isolate dissimilar metals behind siding by covering with polyethylene film.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective siding materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to siding manufacturer's written instructions and maintain in a clean condition during construction.

PRE-MANUFACTURED SHEET METAL ROOFING

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. MBCI SuperLok Metal roofing, associated integral flashings, and underlayment, or as approved equal.
 - B. Flashings, Trim, and Counterflashings per manufacturer.
 - C. Snow guards.
 - D. Metal Soffit
- 1.02 SYSTEM DESCRIPTION
 - A. Pre-coated standing seam metal roof, over insulation, over vapor-retarder and metal deck.
- 1.03 SUBMITTALS
 - A. Submit under provisions of the General Requirements.
 - B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- 1.04 QUALITY ASSURANCE
 - A. Perform work in accordance with Manufacturer's specifications, recommendations and if not indicated SMACNA standard details and requirements.
- 1.05 QUALIFICATIONS
 - A. Fabricator and Installer: Company specializing in sheet metal roof installations with minimum 5 years' documented experience.
- 1.06 REGULATORY REQUIREMENTS
 - A. Conform to applicable code for Roof Assembly Fire Requirements.
 - B. UL: Class C Fire Hazard Classification, UL 90 uplift.
- 1.07 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver, store, protect, and handle products to prevent damage to material or finish.
 - B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
 - C. Prevent contact with materials which may cause discoloration or staining.

1.08 COORDINATION

- A. Coordinate the work with installing associated metal flashings, trims, gutters, downspouts, etc., as the work of this section progresses.
- 1.09 WARRANTY
 - A. Provide roofers two year warranty covering materials (including insulation, flashings, trim, gutters, downspouts,) and workmanship.
 - B. Provide manufacturer's 20-year warranty covering materials (including insulation, flashings, trim, gutters and downspouts), and workmanship for weather tightness.

PART 2 PRODUCTS

- 2.01 METAL ROOFING MANUFACTURERS
 - A. MBCI SuperLok HS, 16-inch wide with 2" ribs.
 - B. Berridge Doublelock 16-inch wide with 2" ribs.
 - B. Substitutions: Under provisions of the General Requirements, or as approved by Architect.

2.02 METAL SOFFIT MANUFACTURERS

- A. MBCI Artisan Series, L12 w/ recessed beads at 4" o.c., 12" wide.
- B. Substitutions: Under provisions of the General Requirements, or as approved by Architect.

2.03 SHEET MATERIALS

A. Pre-Coated Galvanized Steel: ASTM A446, Grade A, G90 zinc coating; 24 gage core steel, shop pre-coated with KYNAR 500 coating, COLOR TO BE SELECTED from full range of standard colors.

2.04 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers, per manufacturer's recommendations.
- B. Underlayment: ASTM D226 No. 30 asphalt saturated roofing felt.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc chromate type.
- E. Protective Backing Paint: Zinc chromate alkyd.
- F. Sealant: Polyurethane type, manufactured by Bostic.
- G. Bedding Compound: Rubber-asphalt type.
- H. Plastic Cement: ASTM D4586, Type I.
- I. Eave (Ice Dam) Protection: ASTM D226, No. 30, unperforated asphalt saturated felts.
- J. Solder: ASTM B32; 50/50 type.
- K. Flux: FS O-F-506.

2.05 SNOW GUARDS

A. Install "S-5! Snow fence" snow guards in accordance with roof manufacturer and Snow Guard Manufacturer, attachment and spacing as recommended by Precision Snow Guards. System shall make no penetrations through the roof panel. Snow fence shall be located above entrances and where adjacent to courtyard/patio areas below and extending 4' beyond edge of low roofs below.

2.06 ROOF INSULATION

A. Insulation: Dow, Polyisocyanurate, Hy-Therm, Insulation Board:

Maximum 48 x 96 inch
4 inches minimum overall thickness, two boards (2" minimum thickness)
with staggered joints, minimum R value of 5.0 per inch or overall 20
20 psi
R-Value of 5.0 per inch
Square
ASTM C1289, less than 1% volume

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains or eaves.
- B. Verify deck is dry and free of snow or ice. Verify joints in wood deck are solidly supported and fastened.
- C. Verify correct placement of wood.
- D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.
- E. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.03 INSTALLATION - EAVE (ICE DAM) PROTECTION

- A. Place eave edge metal flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 12 inches oc.
- B. Apply rubberized asphalt/polyethylene sheet eave protection in accordance with manufacturer's instructions.
- C. Apply lap cement at rate of approximately 1 1/4 gal/100 sq ft over underlayment starter strip.
- D. Starting from lower edge of starter strip, lay additional 36 inch wide strips of underlayment in lap cement, to produce a two ply membrane. Weather lap plies minimum 19 inches and nail in place. Lap ends minimum 6 inches. Stagger end joints of each consecutive ply.
- E. Extend eave protection membrane minimum 4 feet upslope beyond interior face of exterior wall.

3.04 INSTALLATION

- A. Conform to drawing details as provided and recommended by manufacturer.
- B. Apply underlayment in single layer laid perpendicular to slope; weather lap edges 2 inches and nail in place. Minimize nail quantity.
- C. Apply slip sheet in one layer, laid loose.
- D. Cleat and seam all joints.
- E. Use bedding compound for joints between metal and bitumen or metal and felts.
- F. Stagger transverse joints of roofing sheets.
- G. Provide integral gutters, downspouts, fascias, and metal splash pans as required.
- H. Back paint surfaces in contact with dissimilar materials.
- 3.05 STANDING SEAM ROOFING
 - A. Conform to manufacturer's details, recommendations, and specifications.
 - B. Space standing seams at 16 inches oc.
 - C. Lay sheets with long dimension perpendicular to eaves. Apply pans beginning at eaves.
 - D. Lock cleats into seams and flatten.
 - F. Terminate standing seams at ridge, eaves, and hips per manufacturer's details and recommendations.
- 3.06 BUILT-IN GUTTERS and FLASHINGS
 - A. Refer to Section 07620.

3.07 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of the General Requirements.
- B. Do not permit traffic over unprotected roof surface.

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cap and sill flashings.
- B. Counter flashings at roof mounted equipment and vent stacks.
- C. Miscellaneous flashings and closure pieces.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- 1.3 QUALITY ASSURANCE
 - A. Perform work in accordance with SMACNA standard details and requirements.
- 1.4 QUALIFICATIONS
 - A. Fabricator and Installer: Company specializing in sheet metal flashing work with three years documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials which may cause discoloration or staining.

PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Pre-Coated Galvanized Steel: ASTM A446, Grade A, G90 zinc coating; 24 gage core steel, exposed flashings shall be shop prefinished with Signature 300, KYNAR 500 coating of color as selected.

2.2 ACCESSORIES

- A. Fasteners: Galvanized steel with soft neoprene washers.
- B. Underlayment: ASTM D2178, No. 15 asphalt saturated roofing felt.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc chromate type.
- E. Sealant: Polyurethane type, specified in Section 07900.
- F. Bedding Compound: Rubber-asphalt type.
- G. Plastic Cement: ASTM D4586, Type II.
- H. Reglets: Recessed type, galvanized steel; face and ends covered with plastic tape.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of metal, same material as sheet, interlockable with sheet.
- C. Form pieces in longest possible lengths. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam and/or solder for rigidity, seal with sealant.

- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

2.4 FINISH

A. Exposed metal shall be pre-finished with Kynar finish color to be selected.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.3 INSTALLATION

- A. Conform to drawing details included in the SMACNA manual unless otherwise indicated on the drawings.
- B. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

JOINT SEALERS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Preparing substrate surfaces.
 - B. Sealant and joint backing.
- 1.2 QUALITY ASSURANCE
 - A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
 - B. Perform acoustical sealant application work in accordance with ASTM C919.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum years documented experience.
- 1.4 WARRANTY
 - A. Provide five year warranty.
 - B. Warranty: Include coverage for installed sealants and accessories which fail to achieve air tight seal, water tight seal, and exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 SEALANTS

- A. Acrylic Latex (Interior minor movement): ASTM C920, single component, non-staining, nonbleeding, non-sagging, white color paintable; manufactured by Pecora AC 20 + silicone.
- B. Butyl Sealant (Interior minor movement): ASTM C920 single component, solvent release, nonskinning, non-sagging, white, paintable; manufactured by Pecora BC 158.
- C. Silicone Sealant (Exterior, Interior major movement and Water Resistant Areas): Single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding; color as selected or to match adjacent materials; manufactured by Pecora 895 silicone.
- D. Bituminous Based (Paving): Single component, asphalt compound, elongation capability of 0 to 2 percent of joint width.

2.2 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: ASTM D1056; round, closed or open cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suitapplication.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces and joint openings are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions.
- D. Protect elements surrounding the work of this section from damage or disfiguration.

3.3 INSTALLATION

- A. Install sealant in accordance with manufacturer's instructions.
- B. Measure joint dimensions and size materials to achieve required 2:1 width/depth ratios.
- C. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.4 SCHEDULE

- A. Interior; Caulk around all frames, windows, doors, openings, trim, etc., as required to seal or fill gaps, cracks, to make material transitions watertight and/or visually tight and finished.
- B. Exterior; Caulk around all frames, windows, doors, openings, trim, material transitions etc., as required to seal or fill gaps, cracks, to make material transitions watertight and/or visually tight finished.
- C. Paving; Caulk as required to seal or fill gaps, expansion joints, and cracks to make transitions watertight and/or visually tight.

STANDARD STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-rated, fire rated and thermally insulated steel doors and frames.
- B. Interior and exterior glazed light frames.
- C. Special FEMA rated doors and frames.
- 1.02 REFERENCES
 - A. ANSI A117.1 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
 - B. ANSI/SDI-100 Standard Steel Doors and Frames.
 - C. Door Hardware Institute (DHI) The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.
 - D. NFPA 80 Fire Doors and Windows.
 - E. NFPA 252 Fire Tests for Door Assemblies.
 - F. UL 10B Fire Tests of Door Assemblies.
 - G. ANSI A151.1 1,000,000 cycle slam test for extra heavy duty doors and frames.

1.03 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Shop Drawings: Indicate door and frame elevations, internal reinforcement, closure method, and cut-outs for glazing and finish.
- C. Product Data: Indicate door and frame configurations, anchor types and spacings, location of cutouts for hardware reinforcement.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.04 REGULATORY REQUIREMENTS

- A. Fire Rated Door and Frame Construction: Conform to ASTM E152 and NFPA 252.
- B. Installed Door and Panel Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Accept doors and frames on site in manufacturer's packaging. Inspect for damage.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 DOOR MANUFACTURERS

- A. Atlantic Metal Products, Inc.
- B. Overly Manufacturing Co.
- C. Mesker
- D. Curries Co.
- E. CECO
- F. Substitutions: Under provisions of the General Requirements.

2.02 DOORS

- A. Exterior Insulated Doors Non-thermally Broken: SDI-100 Grade III.
- B. Interior Doors (Non-rated and Fire Rated) Honeycomb core: 18 ga. min., SDI-100 Grade III.

2.03 DOOR CONSTRUCTION

- A. Face: Steel sheet in accordance with ANSI/SDI-100. Galvanized at exterior locations.
- B. Core: Polystyrene foam.
- C. Thermal Insulated Door: Total insulation R value of 7.7, measured in accordance with ASTM C236.

2.04 FRAMES

- A. Exterior Frames: 16 gage thick material, base metal thickness. Galvanized at exterior locations.
- B. Interior Frames: 16 gage thick material, base metal thickness.

2.05 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape, mitered corners; prepared for countersink style screws.
- B. Primer: Zinc chromate type.
- C. Silencers: Resilient rubber, fitted into drilled hole.
- D. Glazing: 1" insulated at exterior doors.

2.06 FABRICATION

- A. Astragals for Double Doors: Steel, T shaped, specifically for double doors.
- B. Fabricate doors with hardware reinforcement welded in place.
- C. Attach fire rated label to each door unit.
- D. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.
- E. Configure exterior doors with special profile to receive recessed weatherstripping.
- F. Fabricate frames as welded unit.
- G. Mullions for Double Doors: Removable type, of same profiles as jambs.
- H. Transom Bars for Glazed Lights: Fixed type, of same profiles as jamb and head.
- I. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes.
- J. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- K. Prepare frame for silencers. Provide three single silencers for single doors and mullions of double doors on strike side. Provide two single silencers on frame head at double doors without mullions.
- L. Configure exterior frames with special profile to receive recessed weatherstripping.
- M. Fabricate frames to suit masonry wall coursing with 4 or 2 inch head member.
- 2.07 FINISH Steel Doors
 - A. Steel Sheet: Galvanized to ASTM A52, Primer: Baked, Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch, Doors to be field painted.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI-100 and DHI.
- B. Coordinate installation of glass and glazing.
- C. Install door louvers, plumb, and level.
- D. Coordinate installation of doors and frames with installation of frames and hardware specified in Section 08710.
- E. Coordinate with masonry and wallboard wall construction for anchor placement.
- F. Install roll formed steel reinforcement channels between two abutting frames. Anchor to structure and floor.

3.03 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust door for smooth and balanced door movement.

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire rated and non-rated, **pre-finished**.
- B. Graham Wood Doors or Equal, White Maple, Color to be Selected

1.2 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, and special blocking for hardware, identify cutouts for glazing, and louvers.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics; factory machining criteria, and factory finishing criteria.
- C. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.3 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Quality Standard Section 1300, Custom Grade.
- B. Finish doors in accordance with AWI Quality Standard, grades identified in schedule.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.5 REGULATORY REQUIREMENTS

- A. Fire Door Construction: Conform to NFPA 252, UL 10B.
- B. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as scheduled.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on-site to permit ventilation.

1.7 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.8 COORDINATION

A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.9 WARRANTY

- A. Provide warranty to the following term:
 - 1. Exterior Doors: 5 years.
 - 2. Interior Doors: Life of original installation.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Graham Wood Doors, Select White Maple, Color to be selected
- B. Weyerhaeuser.
- C. VT Industries
- D. Manhattan Door
- E. Substitutions: Under provisions of the General Requirements.

2.2 DOOR TYPES

A. Flush Interior Doors: 1-3/4 inches thick; solid core construction, fire rated as indicated.

2.3 DOOR CONSTRUCTION

- A. Core (Solid, Non-Rated): AWI Section 1300, Type PC-Particleboard.
- B. Core (Solid, Fire Rated): AWI Section 1300, Type FP or FM rating as required or indicated.

2.4 FLUSH DOOR FACING

A. Veneer Facing (Flush Interior Doors): AWI Custom quality Select White Maple, uniform grain.

2.5 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing Wood with metal clips for rated doors, mitered corners; prepared for countersink style screws.

2.6 FABRICATION

- A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.
- B. Fabricate fire rated doors in accordance with AWI Quality Standards and to UL requirements. Attach fire rating label to door.
- C. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.
- D. Provide lock blocks at lock edge and top of door for closer hardware reinforcement.
- E. Vertical Exposed Edge of Stiles: Of same species as veneer facing. Hardwood for transparent finish.
- F. Fit door edge trim to edge of stiles after applying veneer facing.
- G. Bond edge banding to cores.
- H. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Provide solid blocking for through bolted hardware.
- I. Factory pre-fit doors for frame opening dimensions identified on shop drawings.
- J. Cut and configure exterior door edge to receive recessed weather stripping devices. Provide edge clearances in accordance with AWI1600.

2.7 FINISH

- A. Manufacturer's prefinished doors in accordance with AWI Quality Standard Section 1500 to the following finish designations:
 - 1. Pre-finished Doors: Submit full line of actual samples for selection.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install fire rated and non-rated doors in accordance with AWI Quality Standard, NFPA 80 and to Warnock Hersey requirements.
- B. Trim non-rated door width by cutting equally on both jambedges.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm). Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- D. Pilot drill screw and bolt holes. Use threaded through bolts for half surface hinges.
- E. Machine cut for hardware. Core for handsets and cylinders.
- F. Coordinate installation of glass and glazing.

3.3 INSTALLATION TOLERANCES

A. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taught string, corner to corner, over an imaginary 36 x 84 inch surface area.

- B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taught string, top to bottom, over an imaginary 36×84 inch surface area. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taught string, edge
- C. to edge, over an imaginary 36×84 inch surface area.
- ADJUSTING 3.4
 - А. Adjust door for smooth and balanced door movement.

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum doors and frames.
- B. Vision glass and glass.
- C. Door hardware.
- D. Integral air and vapor barrier.
- E. Perimeter sealant.

1.02 SYSTEM DESCRIPTION

A. Aluminum entrances and storefront system includes tubular aluminum sections with supplementary internal support framing, shop fabricated, factory prefinished, vision glass, related flashings, anchorage, and attachment devices.

1.03 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as calculated in accordance with codes.
- B. Limit mullion deflection to flexure limit of glass; with full recovery of glazing materials.
- C. System to accommodate, without damage to components or deterioration of seals, movement within system, movement between system and peripheral construction, dynamic loading and release of loads, deflection of structural support framing.
- D. Limit air leakage through assembly to 0.06 cfm/min/sq. ft. of wall area, measured at a reference differential pressure across assembly of psf as measured in accordance with AAMA 501.
- E. Water Leakage: None, when measured in accordance with AAMA 501 with a test pressure difference of 2.86 lbs/sq. ft.
- F. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental affect to system components.
- H. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.04 SUBMITTALS

A. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work and expansion and contraction joint location and details.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Protect pre-finished aluminum surfaces. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install sealants when ambient temperature is less than 40 degrees F during and 48 hours after installation.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.08 WARRANTY

- A. Provide three year warranty.
- B. Warranty: Include coverage for complete system for failure to meet specified requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Storefront System
 - 1. Manko Product series 2450 I, Door series 150 H Wide Style.
 - 2. Other acceptable manufacturers offering equivalent Products.
 - a. Kawneer.
 - b. TRACO
 - c. EFCO.
 - 3. Substitutions: Under provisions of the General Requirements.

2.02 MATERIALS

- A. Extruded Aluminum: ANSI/ASTM B221; 6063 alloy, T5 temper. Color: White.
- B. Steel Sections: ANSI/ASTM A36; shaped to suit mullion sections.
- C. Fasteners: Galvanized steel.

2.03 COMPONENTS

- A. Frame: 4 1/2 x 2 inch nominal dimension; glazing stops; drainage holes; internal weep drainage system.
- B. Exterior Doors: 2 inches thick, 5-inch wide top rail, 5-inch wide vertical stiles, 10-inch wide bottom rail; square glazing stops.
- C. Vestibule Doors: Equal to Manko Series 150 H Wide Stile Door
- D. Flashings: Aluminum, finish to match mullion sections where exposed.

2.04 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: As specified in Section 08800 of types described below:
 - 1. Glass at Exterior Lights: 1-inch insulated type (outer pane of ¹/₄ inch tinted medium bronze at exterior, inner pane of ¹/₄ inch clear). Tempered where required. Low-E coating on third surface.

2.05 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07900.

2.06 HARDWARE

- A. Weather Stripping, Sill Sweep Strips, Thresholds, Hinges, Tubular Pull Handles, Panic Device, Closer: Type to suit application, and finish, all provided by storefront manufacturer / supplier.
- B. Door Hardware at exterior and vestibule doors shall include manufacturer's standard heavy duty Rim Panic Devices and Full length Roton Hinges. All finishes to match Door/Storefront color.
- C. Cost of Storefront hardware shall be included in the **BID PRICE** of the storefront system provider.
- D. Where scheduled, installer shall coordinated requirements of Access Control provider/installer.
- E. Automatic Handicap operator shall be provided at door 101.
- D. Cylinder locks by hardware supplier.

2.07 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.
- E. Prepare components with internal reinforcement for door hardware and door operator hinge hardware.
- F. Reinforce framing members for imposed loads.

2.08 FINISHES

- A. Finish coatings to conform to AAMA
- B. Exposed Aluminum Surfaces: White.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify site opening conditions.
 - B. Verify dimensions, tolerances, and method of attachment with other work.
 - C. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions and AAMA Metal Curtain Wall, Window, Store Front and Entrance Guide Specifications Manual.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided.
- K. Install glass in accordance with Section 08800, to glazing method required to achieve performance criteria.
- L. Install perimeter sealant to method required to achieve performance criteria, backing materials, and installation criteria in accordance with Section 07900.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- 3.04 ADJUSTING
 - A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work from damage.
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum fixed windows; glass, shop glazed; panning systems.
- B. Perimeter sealant.

1.02 SYSTEM DESCRIPTION

- A. Windows: Tubular aluminum sections, shop fabricated, factory prefinished, vision glass, related flashings, anchorage and attachment devices.
- B. Configuration: Fixed; with manufacturer's standard panning systems.

1.03 PERFORMANCE REQUIREMENTS

- A. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall as measured in accordance with ASTM E330.
- B. Limit member deflection to 1/200; with full recovery of glazing materials.
- C. System to accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.
- D. Limit air leakage through assembly to 0.10 cfm/min/sq. ft. of wall area, measured at a reference differential pressure across assembly of 6 psf as measured in accordance with ASTM E283.
- E. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 9 lb./sq. ft.
- F. Maintain continuous air and vapor barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.
- G. Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; installation requirements.
- B. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.06 ENVIRONMENTAL REQUIREMENTS

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

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. MANKO Product
 - 1. 34032 XPT Series fixed and projected windows. Windows shall have sill, head jamb panning, and snap trim components. Provide all operating hardware and hinging for maximum vertical opening of operable units.
- B. TRACO
- C. Substitutions: Submit for approval under provisions of the General Requirements.

2.02 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper. Color: White.
- B. Fasteners: Galvanized steel. Compatible with window and building materials to not cause corrosion of materials.
- C. Insect Screens: FS RR-W-365, woven aluminum mesh, charcoal finish.
- D. Operable Sash Weatherstripping: Neoprene; permanently resilient, profiled to effect weather seal.

- E. Fasteners: Galvanized steel.
- F. Any steel materials shall be properly isolated from aluminum.
- G. All windows shall include manufacturer's sub-framing around perimeter of all openings and "T" mullions at between-window units.
- H. Surface applied mullions bars at each side or glazing as indicated on drawings.

2.03 GLASS AND GLAZING MATERIALS

- A. Glass and Glazing Materials: Of Types described below:
 - 1. Glass in Exterior Lights: 1 inch insulated 1/4 inch exterior tinted Dark Bronze (coordinate with all other exterior glass same manufacturer and tint), 1/4 inch interior clear and obscure where indicated. Low-E coating on third surface.
- 2.04 SEALANT MATERIALS
 - A. Sealant and Backing Materials: As specified in Section 07900.

2.05 HARDWARE

A. Sash lock: Lever handle with cam lock, white bronze.

2.06 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal reinforcement in mullions with galvanized steel members to maintain rigidity.
- G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

2.07 FINISHES

- A. Finish coatings to conform to AAMA 608.1.
- B. Exterior Exposed Aluminum Surfaces: White.

PART 3 EXECUTION

- 3.01 INSTALLATION
 - A. Install window frames, glass and glazing and hardware in accordance with manufacturer's instructions.
 - B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
 - C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.
 - D. Install sill and sill end angles (i.e. Standard panning system).
 - E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
 - F. Coordinate attachment and seal of perimeter air and vapor barrier materials.
 - G. Install operating hardware.

3.02 TOLERANCES

A. Maximum Variation from Level or Plumb: 0.06 inch every 3 ft non-cumulative or 0.5 inch per 100 ft., whichever is less.

3.03 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manuf.

END OF SECTION 08520

DOOR HARDWARE

PART 1 GENERAL

1.1 **RELATED DOCUMENTS**

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

1.2 **SUMMARY**

- Section includes: A.
 - Mechanical door hardware for the following: 1.
 - Swinging doors. a.
 - 2. Electrified door hardware.
- **Related Sections:** Β.
 - 1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies.
 - 2. Section 081216 "Aluminum Frames" for door silencers provided as part of aluminum frames.
 - Section 081416 "Flush Wood Doors" for integral intumescent seals provided as part of 3. labeled fire-rated assemblies.
 - Section 081416 "Flush Wood Doors" for provided as part of labeled fire-rated assemblies. 4.
 - Section 102600 "Wall and Door Protection" for plastic door protection units that match 5. wall protection units.

1.3 ACTION SUBMITTALS

- Product Data: For each type of product indicated. Include construction and installation details, A. material descriptions, dimensions of individual components and profiles, and finishes.
- Other Action Submittals: B.
 - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - Submittal Sequence: Submit door hardware schedule concurrent with submissions a. of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - Format: Comply with scheduling sequence and vertical format in DHI's "Sequence b. and Format for the Hardware Schedule." Double space entries, and number and date each page.
 - Format: Use same scheduling sequence and format and use same door numbers as c. in the Contract Documents.
 - d. Content: Include the following information:
 - Identification number, location, hand, fire rating, size, and material of each 1) door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - Complete designations, including name and manufacturer, type, style, 3) function, size, quantity, function, and finish of each door hardware product.
 - 4) Fastenings and other pertinent information.
 - Explanation of abbreviations, symbols, and codes contained in schedule. 5) Mounting locations for door hardware.

6)

- 7) List of related door devices specified in other Sections for each door and frame.
- 2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Architectural Hardware Consultant.
- B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 - 1. For door hardware, an Architectural Hardware Consultant (AHC).
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in 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, unless otherwise indicated.
- D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
- E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- G. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

- 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
- 2. Preliminary key system schematic diagram.
- 3. Requirements for key control system.
- 4. Requirements for access control.
- 5. Address for delivery of keys.
- H. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Review sequence of operation for each type of electrified door hardware.
 - 4. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.9 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

1.10 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

PART 2 - PRODUCTS

- 2.1 HINGES
 - A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives
 - b. Bommer
 - c. Hager
 - d. Best Hinges

2.2 CYLINDRICAL LOCKS

- A. GRADE 1
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Schlage ND Series
 - b. Best 9K Series
 - c. Sargent 10 Line
- B. Requirements:
 - 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1. Cylinders: Refer to "KEYING" article, herein.
 - 2. Provide cylindrical locks with classroom security function with an inside indicator that provides clear direction for users to safely and quickly secure the room.
 - 3. Provide locksets able to withstand 3100 inch pounds of torque applied to locked outside lever without gaining access per ANSI/BHMA A156.2 Abusive Locked Lever Torque Test and cycle tested to 3 million cycles per ANSI/BHMA A156.2 Cycle Test.
 - 4. Provide levers with vandal resistant technology for use at heavy traffic or abusive applications. Levers feature internal lock components that prevent damage caused by excessive force from persons kicking, hitting or standing on lever to gain access.
 - 5. Provide solid steel rotational stops to control excessive rotation of lever.
 - 6. Provide completely refunctionable lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 - 7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
 - 8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 - 9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 - 10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - 11. Provide electrified options as scheduled in the hardware sets.
 - 12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
 - a. Lever Design: Schlage Rhodes.

2.3 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following.
 - a. Von Duprin 99 Series
 - b. Sargent 80 Series
 - c. Precision APEX

- B. Additional Requirements:
 - a. Exit devices shall incorporate a fluid damper or other device that eliminates noise associated with exit device operation. Touchpad shall extend a minimum of one half of the door width, but not the full length of the exit device rail. End-cap will have two-point attachment to door.
 - b. Provide electrical options as scheduled.

2.4 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturers: Subject to compliance with requirements provide products by the following.
 - a. Schlage
 - b. Best
 - c. Medeco
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are removable (where specified); face finished to match lockset.

2.5 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system or new system as directed. Verify proper key system.
- B. Keys: Brass.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
- C. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.

2.6 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; brass, unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives
 - b. Rockwood
 - c. Trimco.

2.7 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Astragals: BHMA A156.22.

2.8 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather,

and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

- 1. Manufacturers: Subject to compliance with requirements provide products by the following.
 - a. LCN 4040 Series
 - b. Sargent 281 Series
 - c. Falcon SC71 Series
 - d. Best Door Closers
- 2. Additional Requirements:
 - a. All Closers UL Certified to be in compliance with UBC 7.2 and UL 10C.
 - b. Provide closers with a solid forged steel main arms and factory assembled heavyduty forged forearms for parallel arm closers.
 - c. Closers with pressure relief values will not be acceptable.
 - d. Closer cylinders, arms, adapter plates, and metal covers shall have a powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or shall have special rust inhibitor (SRI).
 - e. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.9 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives
 - b. Rockwood
 - c. Trimco.

2.10 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Glynn Johnson
 - b. ABH
 - c. Rockwood
 - d. Rixson (9 Series)

2.11 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 - 1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
 - a. Zero International
 - b. Pemko
 - c. Reese
 - d. NGP Thresholds

2.12 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
 - 1. Manufacturers: Subject to compliance with requirements provide products by one of the following:
 - a. Ives

- b. Rockwood
- c. Trimco.

2.13 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ives
 - b. Hager
 - c. Rockwood
- 2.14 FABRICATION
 - A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
 - B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
 - C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 - 5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.15 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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

the 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply 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 with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards. Self-tapping screws are not an acceptable means of installation.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule or directed by Owner.
 - 2. Furnish permanent cores to Owner for installation.
- E. Thresholds: Set thresholds for doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. Where gasketing is soffit mounted install prior to any soffit mounted hardware to ensure continuous perimeter seal.
- H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Contractor to instruct owner's personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.7 DOOR HARDWARE SCHEDULE

A. The hardware sets listed below represent the design intent and direction of the owner and Architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the Architect with corrections made prior to the bidding process.

HARDWARE SETS

HARDV	VARE G	ROUP NO. 01								
FOR US	SE ON D	OOR #(S):								
113		119	149	151	157					
PROVII	DE EACI	H SGL DOOR(S) WITI	H THE FO	OLLOWING:						
QTY		DESCRIPTION		CATALOG NUMBER				FINISH	MFR	
1	EA	CYLINDER		VERIFY TYPE REQ'D				626	SCH	
HARDV	VARE B	Y ALUMINUM DOOF	R MANUI	FACTURER. WHERE NOTE	D, COORI	DINA	ΔTE	ELECTR	ONICS	
AND A	CCESS (CONTROL WITH DIV	ISION 28	/LOW VOLTAGE.						
HARDV	VARE G	ROUP NO. 02								
FOR US	SE ON D	OOR #(S):								
101		102								
PROVII	DE EACI	H SGL DOOR(S) WITI	H THE FO	OLLOWING:						
QTY		DESCRIPTION		CATALOG NUMBER				FINISH	MFR	
1	EA	CYLINDER		VERIFY TYPE REQ'D				626	SCH	
1	EA	AUTO OPERATOR		4642 TBWMS 120 VAC			×	689	LCN	
2	EA	ACTUATOR, TOUCH	ł	8310-852T / 8310-818T AS H	REQ'D		×	630	LCN	
REMAI	REMAINDER OF HARDWARE BY ALUMINUM DOOR MANUFACTURER. COORDINATE ELECTRONICS									
AND A	AND ACCESS CONTROL WITH DIVISION 28/LOW VOLTAGE.									

FOR USE ON DOOR #(S):

126

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	99-EO	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	328AA	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	655A	А	ZER
1	EA	DOOR POSITION SWITCH	679-05HM	🖌 BLK	SCE

OPERATIONAL DESCRIPTION: RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. EXIT ONLY. SELF-CLOSING. DOOR POSITION SWITCH MONITORS OPEN/CLOSE POSITION.

HARDWARE GROUP NO. 04

FOR USE ON DOOR #(S):

138

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	99-L-BE-06	626	VON
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	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY TURNING LEVER. LEVER ALWAYS FREE FOR ENTRY. SELF-CLOSING.

HARDWARE GROUP NO. 05

FOR USE ON DOOR #(S):

118 141

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

142

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK W/ OUTSIDE INDICATOR	L9040 06A L583-363 OS-OCC	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	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: PRIVACY LOCK W INDICATOR - LATCHBOLT RETRACTED BY LEVER EITHER SIDE. DEADBOLT ACTUATION BY OUTSIDE EMERGENCY KEY OR INSIDE THUMBTURN. THROWN DEADBOLT DISPLAYS "OCCUPIED" MESSAGE AND LOCKS OUTSIDE LEVER. INSIDE LEVER RETRACTS BOTH DEADBOLT AND LATCHBOLT AND UNLOCKS OUTSIDE LEVER. INSIDE LEVER ALWAYS FREE FOR IMMEDIATE EGRESS. SELF CLOSING.

HARD	WARE	GROUP NO. 06						
108	SE ON	107	112	114	146		154	
156		162						
PROV	IDE EA	CH SGL DOOR(S) WI	TH THE B	FOLLOWING:				
QTY	-	DESCRIPTION		CATALOG NUMBER			FINISH	MFR
3	EA	HINGE		5BB1HW 4.5 X 4.5			652	IVE
1	EA	CLASSROOM SEC	URITY	ND75G RHO XN12-035			626	SCH
1	EA	KICK PLATE		8400 10" X 2" LDW B-CS			630	IVE
1	EA	WALL STOP		WS406/407CCV			626	IVE
1	EA	FINGER GUARD		51A			А	ZER
3	EA	SILENCER		SR64			GRY	IVE
OPER.	ATIONA	AL DESCRIPTION: CL	ASSROC	M SECURITY LOCK - KEY	IN EITHE	R LEVE	R LOCKS	OR
UNLO	CKS OU	UTSIDE LEVER. INSI	DE LEVE	R IS ALWAYS UNLOCKED.	INSIDE L	EVER I	S ALWAY	/S
FREE	FOR IM	MEDIATE EGRESS.						
HARD	HARDWARE GROUP NO. 07							

FOR U	JSE ON	DOOR #(S):			
103		104			
PROV	IDE EA	CH SGL DOOR(S) WITH TH	HE FOLLOWING:		
QTY	7	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53G RHO	626	SCH
1	EA	OH STOP	90S J @ 103	630	GLY
1	EA	WALL STOP	WS406/407CCV @ 104	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: OFFICE LOCK - TURN/PUSH-BUTTON LOCKING; PUSHING AND TURNING BUTTON LOCKS OUTSIDE LEVER, REQUIRING USE OF KEY UNTIL BUTTON IS MANUALLY UNLOCKED. PUSHBUTTON LOCKING; PUSHING BUTTON LOCKS OUTSIDE LEVER UNTIL UNLOCKED BY KEY OR BY TURNING INSIDE LEVER. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

FOR USE ON DOOR #	(\mathbf{S})):
		, -

133 144

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	HDSI-98-L-NL-06	626	VON
1	EA	CYLINDER	VERIFY TYPE REQ'D	626	SCH
1	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: RIM EXIT DEVICE. FREE EGRESS AT ALL TIMES BY PRESSING PUSHBAR. ENTRY BY FIXED LEVER AFTER RETRACTING LATCHBOLT WITH KEY. DOGGING BY KEYED CYLINDER LOCKS DOWN THE PUSHBAR SO THE LATCHBOLT REMAINS RETRACTED AND DOOR FUNCTIONS AS A PUSH/PULL. THE HDSI SECURITY INDICATOR PROVIDES AT A GLANCE VERIFICATION OF THE "LOCKED /UNLOCKED" STATUS FROM INSIDE THE ROOM. DEVICE IS EITHER DOGGED DOWN (UNLOCKED) OR UNDOGGED (LOCKED). SELF-CLOSING HOLD OPEN INCLUDED.

HARDWARE GROUP NO. 09

FOR U	SE ON	DOOR #(S):					
109		117	129	147	153	163	
PROV	IDE EA	CH SGL DOOR(S) WITH	H THE FO	DLLOWING:			
QTY		DESCRIPTION		CATALOG NUMBER		FINISH	MFR
3	EA	HINGE		5BB1HW 4.5 X 4.5		652	IVE
1	EA	CLASSROOM LOCK	-	ND70G RHO		626	SCH
1	EA	OH STOP		90S		630	GLY

3 EA SILENCER SR64 GRY IVE OPERATIONAL DESCRIPTION: CLASSROOM LOCK - OUTSIDE LEVER LOCKED AND UNLOCKED BY KEY. INSIDE LEVER ALWAYS UNLOCKED. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

HARDWARE GROUP NO. 10

FOR USE ON DOOR #(S):

127 131

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

IVE
IVE
SCH
GLY
IVE
I I S (I

OPERATIONAL DESCRIPTION: CLASSROOM LOCK - OUTSIDE LEVER LOCKED AND UNLOCKED BY KEY. INSIDE LEVER ALWAYS UNLOCKED. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS.

FOR USE ON DOOR #(S):

139

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80G RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: STOREROOM LOCK - OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS. SELF CLOSING, BUILT IN STOP.

HARDWARE GROUP NO. 12

FOR USE ON DOOR #(S):

134

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80G RHO	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	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: STOREROOM LOCK - OUTSIDE LEVER FIXED. ENTRANCE BY KEY ONLY. INSIDE LEVER ALWAYS UNLOCKED. INSIDE LEVER IS ALWAYS FREE FOR IMMEDIATE EGRESS. SELF CLOSING.

FOR USE ON DOOR #(S):

106

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

	10 0 0 1					
QTY	7	DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	ND80G RHO		626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC		630	VON
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE
2	EA	WIRE HARNESS LENGTH AS REQUIRED	CON-XX			SCH
1	EA	CARD READER	SECURITY ACCESS CONSULTANT	^	/	
1	EA	DOOR POSITION SWITCH	679-05HM		/ BLK	SCE
1	EA	MOTION SENSOR	SCANII 12/24 VDC		WHT	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		1	VON

OPERATIONAL DESCRIPTION: THE DOOR IS NORMALLY CLOSED AND LOCKED. FROM THE SECURE SIDE PRESENTING VALID CREDENTIALS TO THE READER WILL MOMENTARILY UNLOCK ELECTRIC STRIKE, ALLOWING ENTRY. AFTER ENTRY THE DOOR RETURNS TO THE CLOSED AND LATCHED POSITION. A KEY OVERRIDE WILL ALSO ENABLE ENTRY. FROM THE NON-SECURE SIDE, THE LEVER RETRACTS THE LATCH ALLOWING EGRESS. DURING A POWER LOSS, THE DOOR WILL REMAIN LOCKED AND WILL CONTINUE TO ALLOW FREE EGRESS AT ALL TIMES. THE DOOR POSITION SWITCH MONITORS THE DOOR FOR OPEN/CLOSED POSITION.

HARDW	VARE G	ROUP NO. 14						
FOR US	E ON D	OOR #(S):						
111		116	143	148	152		158	
159		161						
PROVIE	DE EACH	H SGL DOOR(S) WITH	I THE FO	DLLOWING:				
QTY		DESCRIPTION		CATALOG NUMBER			FINISH	MFR
2	EA	HINGE		5BB1HW 4.5 X 4.5			652	IVE
1	EA	PASSAGE SET		ND10S RHO			626	SCH
1	EA	WALL STOP		WS406/407CCV			626	IVE
3	EA	SILENCER		SR64			GRY	IVE
OPERA'	TIONAL	DESCRIPTION: PASS	SAGE LC	OCK – NEITHER LEVER LO	OCKABLE	. BOTH	LEVERS	

ALWAYS FREE FOR IMMEDIATE INGRESS OR EGRESS.

FOR USE ON DOOR #(S):

121

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

(QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	B EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
]	EA EA	SGL CYL DEADBOLT	B660G 12-631	626	SCH
]	EA EA	PUSH PLATE	8200 4" X 16"	630	IVE
]	EA EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
]	EA EA	SURFACE CLOSER	4040XP H	689	LCN
]	EA EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
]	EA EA	WALL STOP	WS406/407CCV	626	IVE
]	L EA	SILENCER	SR64	GRY	IVE

OPERATIONAL DESCRIPTION: FREE EGRESS OR ENTRY WHEN UNLOCKED BY PUSHING PUSH PLATE OR PULLING PULL.DEADBOLT - DEADBOLT THROWN BY THUMBTURN INSIDE OR KEY OUTSIDE. SELF CLOSING WITH BUILT IN HOLD OPEN.

HARDWARE GROUP NO. 16 FOR USE ON DOOR #(S): 124 PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING: OTY DESCRIPTION CATALOG NUMBER FINISH MFR 3 EA FILLER PLATE SHF X SIZE REQ'D DON NOTE: CONTRACTOR TO FIELD VERIFY EXISTING PREP AND MATCH HARDWARE TO CURRENT CONDITIONS. NOTIFY ARCHITECT OF ANY REQUIRED CHANGES. HARDWARE GROUP NO. 17 FOR USE ON DOOR #(S): 136 137 164 166 PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING: QTY DESCRIPTION CATALOG NUMBER FINISH MFR 1 LOCK MATCH EXISTING, REPLACE EA 626 SCH WITH NEW LOCK/PANIC NOTE: CONTRACTOR TO FIELD VERIFY EXISTING PREP AND MATCH HARDWARE TO CURRENT CONDITIONS. NOTIFY ARCHITECT OF ANY REQUIRED CHANGES. HARDWARE GROUP NO. 18 FOR USE ON DOOR #(S): 122 123

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CLASSROOM SECURITY	ND75BD RHO XN12-035 @ 123	626	SCH
1	EA	STOREROOM LOCK	ND80G RHO @ 122	626	SCH

NOTE: REMAINDER OF HARDWARE IS EXISTING AND TO RAMIN. CONTRACTOR TO FIELD VERIFY EXISTING PREP OF LOCK AND MATCH HARDWARE TO CURRENT CONDITIONS. NOTIFY ARCHITECT OF ANY REQUIRED CHANGES.

END OF SECTION 087100

AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following types of automatic door operators:
 - 1. Exterior and interior, automatic door operators, low energy, with visible header mounting.
 - Automatic door operators shall be configured for doors as follows:
 a. Single doors.
- B. Related Sections:
 - 1. Division 8 Section "Doors and Frames" for entrances furnished and installed separately in Division 8 Section.
 - 2. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
 - 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - 4. Division 26 Sections for electrical connections provided separately including conduit and wiring for power to, and control of, automatic door operators.
- 1.3 REFERENCES
 - A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
 - B. Underwriters Laboratories (UL):
 - 1. UL 325 Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
 - 2. UL 10C Positive Pressure Fire Tests of Door Assemblies
 - C. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
 - 1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
 - 2. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
 - D. American Society for Testing and Materials (ASTM):
 - 1. ASTM B221 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - E. American Association of Automatic Door Manufacturers (AAADM):
 - F. National Fire Protection Association (NFPA):
 - 1. NFPA 101 Life Safety Code.
 - G. NFPA 70 National Electric Code. International Code Council (ICC):
 - 1. IBC: International Building Code

- H. Building Officials and Code Administrators International (BOCA), 1999:
- I. International Standards Organization (ISO):
 - 1. ISO 9001 Standard for Manufacturing Quality Management Systems
 - 2. ISO 14025 Environmental Labels and Declarations -- Type III Environmental Declarations -- Principles and Procedures
 - 3. ISO14040 Environmental Management -- Life Cycle Assessment -- Principles and Framework
 - 4. ISO 14044 Environmental Management -- Life Cycle Assessment -- Requirements and Guidelines
 - 5. ISO 21930 Sustainability in Buildings and Civil Engineering Works -- Core Rules For Environmental Product Declarations Of Construction Products And Services
- J. National Association of Architectural Metal Manufacturers (NAAMM):

1. Metal Finishes Manual for Architectural and Metal Products.

- K. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 606.1 Integral Color Anodic Finishes for Architectural Aluminum.
 - 2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

1.4 DEFINITIONS

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- B. Knowing act: Consciously initiating the opening of a power operated door using acceptable methods including wall mounted switches such as push plates and controlled access devices such as keypads, card readers, and key switches.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic door operators capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).
- C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) to set door in motion, and not more than 15 lbf to fully open the door. Forces shall be applied at 1" (25 mm) from the latch edge of the door.

1.6 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- C. Color Samples for selection of factory-applied color finishes.
- D. Closeout Submittals: Provide the following with project close-out documents.
 - 1. Owner's Manual.
 - 2. Warranties.
- E. Reports: Based on evaluation performed by a qualified agency, for automatic door operators.
 - 1. Environmental Product Declaration.
 - 2. Evaluation Report for compliance with IBC.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.

- C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.
- D. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
 - 1. ANSI/BHMA A156.10 and A156.19.
 - 2. NFPA 101.
 - 3. UL 325 Listed.
 - 4. UL 10C Listed.
 - 5. IBC 2018.
 - 6. BOCA.
- E. Environmental Product Declaration (EPD): EPD for automatic door operators shall be certified by the manufacturer to comply with the following:
 - 1. Prepared under Product Category Rule (PCR) UNCPC 4212.
 - 2. Conform to ISO standards 14025, 14040, 14044, 21930
 - 3. Life Cycle Assessment Basis: Cradle to Gate, minimum.
- F. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.
- G. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of swinging doors equipped with automatic door operators and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- H. Power Operated Door Standard: ANSI/BHMA A156.19.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- J. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

1.8 PROJECT CONDITIONS

- A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

1.9 COORDINATION

- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, remote activation devices, and electric door latching hardware.
- C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

1.10 WARRANTY

A. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

- B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.1 AUTOMATIC DOOR OPERATORS

A. Manufacturer: Stanley Access Technologies; M-ForceTM Series automatic door operator, or equivalent product meeting specifications.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Headers: 6063-T6.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Sheet and Plate: ASTM B 209.

2.3 COMPONENTS

- A. Header Case: Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials.
- D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

2.4 SWINGING DOOR OPERATORS

- A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.
 - 1. Operation: Power opening and spring closing.
 - 2. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
 - 3. Handing: Non-handed; no tools required to change handing.
 - 4. Capacity: Rated for door panels weighing up to 700 lb (318 kg).
 - 5. Mounting: Visible
 - 6. Features:
 - a. Adjustable opening and closing speeds.
 - b. Adjustable opening and closing force.
 - c. Adjustable back-check.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Reverse on obstruction.
 - f. Time delay for electric lock integration.

- g. Force compensation and closed loop speed control with active braking and acceleration.
- h. Power Close.
- i. Slam Protection.
- j. Power Assist.
- k. Lock Release.
- 1. Stall Sensor Ignore.
- m. Electronic Coordination.
- n. Optional Switch to open/Switch to close operation.
- o. Optional push to activate operation.
- p. Fire alarm interface, configurable to safely open or close doors on signal from fire alarm system.
- C. Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.
- D. Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
- E. Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
- F. Consistent Cycle: The operator shall deliver an even, consistent open manual push force across the entire transition from door fully closed to door fully open. Additionally, the force shall be field adjustable to accommodate a wide range of on-site conditions.
- G. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.
- H. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- I. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 5 amps.

2.5 ELECTRICAL CONTROLS

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and a high-resolution position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.
 - 1. The high-resolution encoder shall have a resolution of not less than 1024 counts per revolution. Systems utilizing external magnets and magnetic switches are not acceptable.
 - 2. Electrical control system shall include a 24 VDC auxiliary output rated at 1 amp.
- B. Performance Data: The microprocessor shall collect, and store performance data as follows:
 - 1. Counter: A non-resettable counter to track operating cycles.
 - 2. Event Reporting: Unit shall include non-volatile event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.

C. LED Display: Display presenting the current operating state of the controller. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:

- 1. Automatic Reset Upon Power Up.
- 2. Main Fuse Protection.
- 3. Electronic Surge Protection.

- 4. Internal Power Supply Protection.
- 5. Resetable sensor supply fuse protection.
- 6. Motor Protection, over-current protection.
- D. Power Close: When enabled, engages the operator to close a door that does not close completely at the end of a cycle.
- E. Force Compensation: Utilizing the closed loop speed control, the operator shall maintain constant opening and closing speeds when subjected to excessive outside forces, such as positive or negative stack pressures.
- F. Slam Protection: The operators speed control system prevents door from slamming at the full open or full closed position.
- G. Power Assist: Operator mode that lowers opening forces when the door is used manually. Power assist is active only while pushing or pulling the door. The door will close when an opening force is no longer applied.
- H. Lock Release: On doors with electric locking, operator shall include a closing function to release tension on a latch mechanism prior to opening the door.
- I. Stall Sensor Ignore: Adjustable setting to disable swing side safety sensors at a specific angle.
- J. Electronic Coordination: On pairs of doors, allows independent timing of opening and closing of each leaf as required for astragal coordination.
- K. Soft Start/Stop: A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
- L. Obstruction Recycle: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle.
- M. Programmable Controller: Microprocessor controller shall be field programmable.
 - 1. The following parameters may be adjusted:
 - a. Operating speeds and forces as required to meet specified ANSI/BHMA standard.
 - b. Adjustable and variable features specified.
 - 2. Manual programming shall be available through local interface which has a two-digit display with a selection control including three push buttons.
- N. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset, and power will be resumed.
- O. Control Switch: Automatic door operators shall be equipped with a three-position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.
- P. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

2.6 ACTIVATION DEVICES

A. Push Plates: Provide 4 ¹/₂ inch (114 mm) square push plates with UL recognized SPDT switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open". Push plates shall be wall mounted in single or double gang electrical boxes. Provide wireless connection to door operator controls.

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
 - 1. Color: White

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
 - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set headers, arms, and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING

A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

3.5 CLEANING AND PROTECTION

A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION 087113

GLAZING

PART 1 GENERAL

A.

1.01 SECTION INCLUDES

A. Glass and glazing for Sections referencing this Section for products and installation.

1.02 PERFORMANCE REQUIREMENTS

- Glass and glazing materials of this Section shall provide continuity of building enclosure vapor and air barrier:
- 1. To utilize the inner pane of multiple pane sealed units for the continuity of the air and vapor seal.
- 2. Maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Size glass to withstand dead loads and positive and negative live loads acting normal to plane of glass as calculated in accordance with UBC 91 code.
- C. Limit glass deflection to 1/200 flexure limit of glass with full recovery of glazing materials, whichever is less.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.04 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.05 COORDINATION

A. Coordinate the Work with glazing frames, wall openings, and perimeter air and vapor seal to adjacent Work.

1.06 WARRANTY

- A. Provide five year manufacturer's warranty.
- B. Warranty: Include coverage for sealed glass units from seal failure, interpane dusting, or misting, reflective coating on mirrors, delamination of laminated glass and replacement of same.

PART 2 PRODUCTS

2.01 FLAT GLASS MATERIALS

- A. Float Glass (Type FG): Clear, 1/4 inch thick minimum.
- B. Safety Glass (Type SG): Clear; fully tempered with horizontal tempering 1/4 inch thick minimum at all locations where glass is less than 18 inches above finished floor.
- C. Tinted Glass (Type TG): Float type, heat strengthened, light reducing, color (to be selected); 1/4 inch thick minimum.
- D. Wire Glass (Type WG): Clear, polished both sides diagonal mesh of woven stainless steel wire of 1/2 inch grid size; 1/4 inch thick.
- E. Mirror Glass (Type MG): Clear tempered safety type with copper and silver coating, organic overcoating, rounded, sanded, edges, 1/4 inch thick minimum, sizes as indicated.
- F. Shatter Resistant Glass: (Type SRG): Clear laminated, 5/16 inch composite 2 1/8-inch thick panels laminated with .060 inner layer film, sizes as indicated.

2.02 SEALED INSULATING GLASS MATERIALS

- A. Insulated Glass Units (Type IG): ASTM E774 and E773; double pane with edge seal; outer pane of 1/4 inch glass tinted at exterior, inner pane of 1/4 inch glass. Low-E coating on third surface. Provide integral blinds and all operating hardware where indicated on drawings.
- B. Performance Requirements: U-Value: Winter Night – 0.29 Summer Day – 0.27 R-Value – 3.43 Shading Coefficient (sc) – 0.37 Solar Heat Gain Coefficient (SHGC) – 0.32 Relative Heat Gain (RHG) – 77 Light to Solar Gain (LSG) – 1.23 Sound Transmission Class (STC) - 35

2.03 SPECIAL GLASS AND GLAZING SYSTEMS

- A. Fire rated glass to be part of a 90-minute-rated door/window assembly.
 - 1. Product FireLite® Plus, Premium Grade.

2.04 GLAZING COMPOUNDS

- A. Exterior windows not shop installed shall be glazed with vinyl or neoprene gaskets, extruded elastic polybutene tape sealant, a combination of polysulphide base compound and elastic glazing compound, or a combination of extruded polysulphide tape, polysulphide base compound elastic glazing compound.
- B. Doors and interior stopped -in glass shall be glazed using putty or elastic glazing compound and stop beads.
- C. Exterior glazing of steel sash shall be DAP Metal Glaze. Interior glazing of steel sash shall be DAP Steel Sash Putty.

2.05 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene or Silicone, 80 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene or Silicone, 50 60 Shore A durometer hardness, minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 15 Shore A durometer hardness; coiled on release paper.
- D. Glazing Clips: Manufacturer's standard type.
- E. Mirror Attachment Accessories: Mirror adhesive, chemically compatible with mirror coating and wall substrate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install glazing in accordance with Flat Jobbers Association Glazing Manual.

3.03 INSTALLATION - MIRRORS

- A. Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.
- B. Place plumb and level.

3.04 CLEANING

A. Remove glazing materials from finish surfaces. Remove labels after work is complete. Clean glass and mirrors.

3.05 PROTECTION OF FINISHED WORK

A. After installation, mark pane with an "X" by using removable plastic tape or paste. Do not mark heat absorbing or reflective glass units.

END OF SECTION 08800

GYPSUM BOARD SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Acoustical insulation.
- C. Gypsum board.
- D. Water resistant tile backer board.
- E. Taped and sanded joint treatment, Level 5 finish.

1.02 REFERENCES

- A. ASTM C36 Gypsum Wallboard.
- B. ASTM C475 Joint Treatment Materials for Gypsum Wallboard Construction.
- C. ASTM C630 Water Resistant Gypsum Backing Board.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS GYPSUM BOARD SYSTEM
 - A. National Gypsum Company.
 - B. Other acceptable manufacturers offering equivalent products.
 - C. Substitutions: Under provisions of the General Requirements.
- 2.02 FRAMING MATERIALS
 - A. Reference Section 9111 Metal Stud.
- 2.03 GYPSUM BOARD MATERIALS
 - A. Fire Rated Gypsum Board: ASTM C36; Gypsum, Type "X" fire resistive type, UL rated; 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. Product Goldbond XP Fireshield. Provide Hi-Abuse Product at all areas below 8', or equivalent product.
 - B. Standard Gypsum Board: Areas above 8' ASTM E90; type "X" fire resistive type, UL rated, 5/8 inch thick, maximum permissible length; ends square cut, tapered edges. Product equal to National Gypsum Gold Bond Gypsum Board, or equivalent product.
 - C. Gypsum Wall Board Tile Backer: ASTM C36; Gypsum, Type "X" fire resistive type, UL rated; 5/8 inch thick. Acrylic coated mold and moisture resistant panel. Panels to be cut to maximum permissible length; ends square cut, tapered edges. Product Goldbond eXP, or equivalent product. Located at all interior and exterior walls scheduled to receive tile or FRP.

2.04 ACCESSORIES

- A. Acoustical Insulation: glass fiber, friction fit type, unfaced, 3 1/2 or 5 1/2 inch thick.
- B. Corner Beads: Metal. Provide 1" Radius corners at EBD office and EBD classrooms.
- C. Edge Trim: GA 201 and GA 216; Type L bead.
- D. Joint Materials: ASTM C475; reinforcing tape, joint compound, adhesive, and water.
- E. Fasteners: ASTM C1002, Type S12, W, and GA-216.
- F. Resilient channel: USG, RC-1 or equal.
- G. Molded Reveal Joints: Fry Reglet, $\frac{1}{4}$ " x $\frac{1}{4}$ "; DRM 25 25.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify that site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

3.02 METAL STUD INSTALLATION

- A. Install studs in accordance with ASTM C754 and manufacturer's instructions.
- B. Metal Stud Spacing: 16 inches on center, unless noted otherwise.
- C. Refer to Drawings for indication of partitions, extend stud framing through the ceiling to the structure above, unless noted otherwise. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- D. Door Opening Framing: Install double studs at door frame jambs. Install stud tracks on each side of opening, at frame head height, and between studs and adjacent studs.

E. Blocking: Nail wood blocking to studs or Bolt or screw steel channels to studs. Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

3.03 WALL FURRING INSTALLATION

- A. Erect wall furring for direct attachment to concrete block walls.
- B. Erect furring channels vertically; space maximum 16 inches on center, not more than 4 inches from floor and ceiling lines, abutting walls.
- C. Install thermal insulation between furring channels directly attached to concrete masonry walls in accordance with manufacturer's instructions.
- D. Erect free-standing metal stud framing tight to concrete masonry walls, attached by adjustable furring brackets in accordance with manufacturer's instructions.

3.04 FURRING FOR FIRE RATINGS

- A. Install furring as required for fire resistance ratings indicated.
- B. Columns in rated walls shall be wrapped independently from wall system.

3.05 CEILING FRAMING INSTALLATION

- A. Coordinate location of hangers with other work.
- B. Install ceiling framing independent of walls, columns, and above ceiling work.
- C. Reinforce openings in ceiling suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.
- D. Laterally brace entire suspension system.

3.06 ACOUSTICAL ACCESSORIES INSTALLATION

- A. Install resilient channels at maximum 12 inches on center. Locate joints over framing members.
- B. Place acoustical insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

3.07 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with manufacturer's instructions.
- B. Erect single layer standard gypsum board vertical, with ends and edges occurring over firm bearing.
- C. Erect single layer fire rated gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Use screws when fastening gypsum board to metal furring or framing.
- E. Place second layer perpendicular to first layer. Offset joints of second layer from joints of first layer.
- F. Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.
- G. Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum board with sealant.
- H. Place control joints consistent with lines of building spaces and as directed. Install at approximately 30' intervals in walls. Coordinate locations with Architect.
- I. Place corner beads at external corners as indicated. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials as indicated.
- J. Caulk at sound walls.

3.08 JOINT TREATMENT

- A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready for finishes.
- B. Feather coats onto adjoining surfaces so that camber is maximum 1/32.
- C. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
- D. Tape joints and corners of cementitious backing board using cement based joint compound as recommended by the manufacturer.
- E. Level 5 finish. Level 4 finish is acceptable at storage rooms only.

3.09 TOLERANCES

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

END OF SECTION 09260

SECTION 09260-A Gypsum Board Systems Preinstallation Checklist

Wall Framing Checklist for Construction Projects Prior to Final Sheetrock Application

Date: _____

Name of Inspector:_____

Location of walls inspected:

	ITEMS TO INSPECT	
1.	Clean all cavities in side wall frame with a vacuum. Do not leave any trash, dirt, dust or debris of any kind in side wall.	
2.	Verify all framing is securely anchored and fastened. Verify no screws are missing. Any bent or twisted studs or track will be repaired or replaced. Verify anchoring is by specification or industry standard. Additional anchoring at door locations.	
3.	Ensure all cross bracing and necessary seismic connections are in place when applicable.	
4.	Any rusted framing or door frames will be removed and replaced with new material.	
5.	Verify all door frame openings are properly fastened and frame grouted. Header installed, tabs anchored to the floor, heavy gage Jack studs and King studs used on each side of frame (Refer to spec for gage size).	
6.	Verify all electrical boxes and conduits are anchored to stud securely in such a manner that pushing on any corners of the box will not allow the box to move inwards.	
7.	All plumbing piping anchored securely. Verify all piping is connected, tested for leaks and insulated per specification.	
8.	Verify all wall backing is installed for items such as hand rails and toilet accessories (refer to plans and specification for items and location). a. Verify any wood backing used is labeled fire rated stock.	
9.	Verify all batt insulation is secured in place in such a manner to keep it from siding down over time once the wall is built. Supplement friction fit to ensure batts remaining as placed.	
10.	Verify all sound attenuation material is installed per specification and manufactures instructions.	
11.	Verify all trades have coordinated proper installation of items at the proper locations per project plans.	
12.	Verify all medical gas piping is installed, supported an anchored per specification and code requirement.	
13.	Verify mechanical ducting systems are installed, supported, and anchored per specification and all joints fully sealed and insulation is completed.	
14.	Verify all through floor or deck penetrations that will be within the wall are properly caulked and sealed with specified materials.	

FLOOR AND WALL TILE

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. Ceramic tile floor finish using the thinset application method or as recommended by Manufacturer.
 - B. Ceramic tile wall finish using the thinset application method.

1.02 SUBMITTALS

- A. Submit under provisions of the General Requirements.
- B. Product Data: Provide instructions for using adhesives and grouts.
- C. Samples: Submit two samples illustrating pattern, color variations, and grout color.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site.
- B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
- 1.04 ENVIRONMENTAL REQUIREMENTS
 - A. Do not install adhesives in an unventilated environment.
 - B. Maintain 50 degrees F during installation of mortar materials.
- 1.05 EXTRA MATERIALS
 - A. Provide 10 square feet (full/uncut) of each type of tile to Owner.

PART 2 PRODUCTS

- 2.01 TILE MANUFACTURER
 - A. Dal-Tile Products: Reference Schedule.
 - B. Substitutions: Under provisions of the General Requirements, Materials listed are for pricing purposes, final colors to be selected by Architect. Alternate tile manufacturers and styles may be selected at architect's discretion, based on similar cost and availability.

2.02 CERAMIC TILE MATERIALS

A. Porcelain Floor, Wall & Base Tile: ANSI A137.1, reference schedule.

2.04 ADHESIVE MATERIALS

A. Adhesives: Thinset bond type as recommended and/or manufactured by the tile manufacturer.

2.05 MORTAR MATERIALS

A. Mortar Materials: Portland cement, sand, latex additive, and water as recommended and/or manufactured by the tile manufacturer, color to be selected.

2.06 GROUT MIX

- A. Mix and proportion pre-mix grout materials in accordance with manufacturer's instructions. Color to be selected.
- B. Manufacturer: TEC, AccuColor Power Grout, full range of colors.
- PART 3 EXECUTION
- 3.01 EXAMINATION
 - A. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Apply sealer conditioner to substrate surfaces in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - THINSET METHOD

- A. Install adhesive tile, thresholds, and grout in accordance with manufacturer's instructions and/or the TCA Handbook.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Place edge strips at exposed tile edges.
- D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base, and wall joints.
- E. Place tile joints uniform in width, Floor joints shall be as narrow (approximately 1/8") as allowed by manufacturer, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout. Provide mock-up area (approximately 4'x4') for owner review of joint spacing and grout depth prior to installation of finish floor tile.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep expansion, control joints free of adhesive or grout. Apply sealant to joints.
- H. Allow tile to set for a minimum of 48 hours prior to grouting.
- I. Grout tile joints.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- K. Aluminum transition shall be installed where abutting different materials. Contractor shall provide all floor leveling to ensure level match between abutting floor finishes.
- L. All exposed tile edges shall be finished with aluminum edge band equal to Schluter aluminum edge strip.

3.04 CLEANING

- A. Clean tile and grout surfaces.
- B. Grout Joints shall be sealed (2 coats) using sealer product as recommended by the grout manufacturer.

3.05 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 4 days after installation.
- B. Install protective material as required to protect finished installation thru completion of construction.

3.06 SCHEDULE OF TILES

- A. Styles and colors identified are for bidding purposes, final styles and colors may vary depending on availability and alternate manufacturers or installers.
 - 1. Wall Tile CT1 (field) Wall Tile CT 4 (field) Daltile Semi-Gloss and Matte. 6x6 field color with accent tile color group 4 (25%) random pattern. Located at all restrooms. Grout colors to be selected by Architect.
 - 2. Floor Tile CT2 (Field) Dal-Tile Porcelain, Portfolio., 12" x 24", 3/8" thickness, non-polished; Staggered joint pattern. Color to be Selected. Located at all Restrooms.
 - 3. Grout colors to be selected by Architect.

END OF SECTION 09306

RESINOUS FLOORING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Seamless resinous flooring. Double Broadcast Basis of Specification is Desco Quartz Granite Series, trowel finish.
 - 2. Coved seamless wall base.

1.3 QUALITY ASSURANCE

- A. All materials must be recommended and manufactured by a single supplier to insure compatibility and proper chemical and mechanical bond.
- B. Surfacing shall be applied by a surfacing applicator approved by the Architect, with a minimum of five (5) years' experience installing the brand of surfacing in similar size and function projects. A list of five (5) completed projects using the specified materials must be submitted proving five (5) years' experience by the lead mechanic.
- C. Surfacing applicator shall provide to the architect a completed list of jobs including the names of the Architect, General Contractor, Owner, and telephone numbers of all concerned, materials used, quantity installed, and date completed on similar projects.
- D. Surfacing applicator must provide a written guarantee for materials and workmanship between applicator and surfacing manufacturer for one (1) year.
- E. Surfacing applicator or manufacturer seeking approval of products other than what is specified must supply samples, full product information, technical data with specifications, certification from an independent testing laboratory that the product being submitted for approval meets all requirements of the performance properties specified within this specification, installation instructions and comply with the above quality assurances in writing.
- F. Bidders will be notified by addendum of substitute surfacing materials, if approved.
- G. Bidder may submit voluntary alternate system noting any variation from basis of specification. Include similar completed job references as indicated in 1.3.C, above.

1.4 SUBMITTALS

- A. Surfacing applicator shall submit samples of color and textures for Owner's approval.
- B. Prior to commencing work, at Owner's discretion, applicator shall install a 100 square foot sample on the job of desired color and texture and when approved, this will serve as the standard for the entire project.

1.5 PRODUCT STORAGE AND ENVIRONMENTAL CONDITIONS

- A. Material temperatures shall be a minimum of 55°F before use.
- B. Work on seamless flooring shall not commence until the building can be maintained at a minimum temperature of 55°F for 48 hours before, during and 48 hours after application. Areas shall also be broom clean and reasonably dust free and shall have adequately controlled ventilation with bright, uniform lighting.

1.6 PROJECT CONDITIONS

- A. Before commencing work, ensure environmental and site conditions are suitable for application and curing.
- B. Surfaces shall be acceptable in accordance with flooring manufacturer's recommendations.
- C. Notify Architect and Ôwner in writing of unsuitable surfaces and conditions. Commencement of work shall imply acceptance of surfaces and working conditions.
- D. Recommended Moisture Vapor Transmission Considerations:
 - 1. Placement of on-grade slabs over a Class A vapor retarder as defined by ASTM E-145.
 - 2. A water cement ratio of 0.45 and 0.5.
 - 3. Curing by ASTM C-171 sheet materials for curing concrete.
4. A slump in the range of 3 to 4 inches, which can be increased by the use of super plasticizers.

E. Substrate Requirements

- 1. Appendix A, this section clarifies general subfloor requirements
- 2. Contractor shall prep the subfloor with a manufacturer approved top-coat vapor barrier. All costs for labor and material to install vapor barrier shall be included in the installers **Base Bid**.

1.7 **PROTECTION**

A. Protect adjacent surfaces from damage resulting from work of this trade. If necessary, mask and/or cover adjacent surfaces, fixtures, cabinet work, equipment, etc. by suitable means.

1.8 WARRANTY

A. Applicator shall notify manufacturer of project requirements before bidding. Manufacturer shall provide written statement before bidding to the Architect that they accept single source warranty for entire installation including labor for one year. Warranty shall include removal and replacement if proven defective. Defective items are, but not limited to debonding, regionalized discoloration, excessive wear, and staining by bodily fluids. Non-acceptance in writing by manufacturer is grounds for rejection of product.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Seamless Floor Covering where called for on the drawings, install a **Desco Granite Series** Floor manufactured by Desco Coatings, Inc. **1-800-426-4164**.
 - 1. Approved manufacturers All products must meet specifications.
 - a. Tnemec
 - b. Florock
- B. Provide 6" high turned up coved base with 1" radius cove as indicated on drawings..
- C. Binder and all successive grout and top coats shall be 100% solids clear/epoxy resin. Ceramic coated quartz aggregates as supplied by Desco Coatings are to be used to achieve all color. No pigmented epoxy base or top coats allowed.

D. Minimum Performance Characteristics:

1.	Compressive Strength (ASTM C-5	579) 10,700-11,000 psi
2.	Tensile Strength (ASTM C-307)	2,250 psi
3.	Flexural Strength	4,000 psi
4.	Shore D Hardness (ASTM D-2240	85-90
5.	Bond Strength (ASTM D-4541)	425 psi
6.	Abrasion Resistance (ASTM D-40	60) 0.08 gm
7.	Pot Life	35 min
8.	Cure Time @ 77° F	10-12 hours
9.	Flammability (ASTM D-635)	35-40 passes
10.	Impact Resistance (MIL-D-3135)	160 in/lb
11.	Indention (MIL-D-3134)	2,000 psi
12.	Tabor Abrasion w/aluminum oxide	e 25-30 mg loss
Epoxy top coats shall produce no color shift after exposure to fluorescent lighting on		
	the "b" axis yellow index after 3 weeks exposure.	
	20% Hydrochloric Acid	10% Lactic Acid
	Urine	Tea
	Coffee	Mustard
	Ethyl Alcohol	Mercurochrome

PART 3 – EXECUTION

3.1 TESTING OF CONCRETE SUBSTRATE

One of the following three methods shall be used to determine moisture content of slab at time of application. These test only measure the specific area tested at the time of the test and are not predictors of future substrate conditions.

Betadyne

- A. Using a Tramax concrete moisture detection device, firmly apply the test apparatus to concrete that has had sealers or other subsequent coatings removed. The readings shall be 4.2% or less. If readings are higher, use ASTM F-2170 for non-conditional spaces and/or ASTM F1869 for conditioned spaces.
- B. ASTM F-2170 in site Relative Humidity Test. Follow test procedures of manufacturer of testing equipment. Reading should be below 80%. If above 80%, use the next test method below. (Only if space is conditioned.)
- C. ASTM F-1869 Calcium Chloride Moisture Vapor Transmission Test. Follow test procedures of manufacturers of MVT kits. Results should be below 3 to 4 lbs/1,000 square feet/24 hours.

3.2 FLOORING PREPARATION

- A. Surface must be clean, sound, and dry.
- B. Effectively remove concrete laitance on accessible floor surfaces by mechanical shot blast. Acid etching is not acceptable.
- C. Areas where flooring is existing must be cleaned to remove all floor material, grease, or any residue that might retard interfacial adhesion between substrate and surfacing.
- D. Application of flooring implies that installer has performed test indicated in Paragraph 3.1, and slab is suitable for flooring installation.
- E. Contractor shall include installation of manufacturer approved top-coat vapor barrier over new concrete slab as required to achieve warranty for the flooring system, **per the Base Bid**. If pre-installation testing determines vapor barrier is not required, a deductive change order will be issued for the material and installation.

3.3 FLOORING APPLICATION

- A. Apply flooring in accordance with manufacturer's printed instructions, employing lead mechanic qualified under the quality assurance portion of this specification, using equipment specifically designed for this purpose.
- B. Flooring System:
 - 1. Desco Quartz Granite Series TG is a trowel grade floor consisting of Desco quartz grade color chips. The system should be hand troweled to 3/16" thickness over epoxy primer. Texture shall be medium. Actual finish texture samples shall be submitted for approval. Note that different finishes may be selected at different areas.
 - 2. Color to utilize minimum of three colors to be selected from manufacturers standard color range.
- C. Install integral cove base to height of 6" with 1" radius cove as described in

Paragraph 2.1.B.

- 1. Trowel apply vertical cove base.
- 2. Hand sand cove base.
- 3. Apply three coats of resin to assure a smooth surface and cove.
- 4. Do not allow resin to puddle in cove.
- D. Finished work shall match approved samples; be uniform in thickness, sheen, color, pattern, and texture; and be free from defects detrimental to performance.

3.2 **PROTECTION**

A. After completion of flooring the General Contractor/Owner shall protect flooring from damage by other trades.

END OF SECTION 09400 (--Appendix A attached)

APPENDIX A

GENERAL SUBFLOOR REQUIREMENTS

CONTROL JOINTS

- A. Control Joints. Slab is existing with small patched areas. Installer shall verify joint locations and install flooring joints, fillers, etc. accordingly by methods below.
 - 1. Install control and expansion joints in accordance with standard practice per ACI-501.
 - 2. The floor contractor may fill non-moving control joint(s) with approved elastomeric sealant or full depth semi-rigid two-component epoxy joint filler, designed specifically for this purpose (use full depth joint filler when reinforcement of the joint edges is desirable), or two-component epoxy and filler (epoxy to be same material as flooring). Movement may crack surfacing unless proper detailing has been done.
 - 3. Filling of moving isolation joints or expansion joints is not recommended.
 - 4. Filling of non-moving isolation joints with elastomeric caulking and sealants or with a semirigid epoxy joint filler or two-component epoxy and filler is acceptable. Movement may crack surfacing unless proper detailing has been done.
 - 5. Joint identified by owner/designer or general contractor as moving joints shall be treated by terminating flooring on each side of joint. After flooring is completed, joint shall then be filled by sealant contractor.

BACKING FOR COVE BASE

Surface to receive cove and/or base shall be strong, durable, and dry. Suitable backings include: Concrete, cement plaster, standard light-weight block, clay, sand-lime, cement bricks, and drywall with a toe plate. Masonry surface(s) to be free of voids, irregularities and recessed joints (if present, fill with recommended epoxy plaster).

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system and perimeter trim, to match existing.
- B. Acoustical tile, to match existing.

1.02 SYSTEM DESCRIPTION

B. Suspension system to rigidly secure acoustical ceiling system including integral mechanical and electrical components with maximum deflection of 1/360.

1.03 SUBMITTALS

- A. Product Data: Provide data on metal grid system components, and acoustical units.
- B. Samples: Submit two samples illustrating material and finish of acoustical units.
- C. Samples: Submit two samples each, of suspension system main runner, cross runner, and edge trim.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

- A. Grid and Tile Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Conform to applicable code for fire rated assembly and combustibility requirements for materials.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS SUSPENSION SYSTEM
 - A. Armstrong Product: Prelude XL Heavy Duty Galvanized Exposed Tee 15/16"
 - B. Armstrong Product Prelude Plus XL Aluminum Exposed Tee 15/16"> MRI Room Compatible
 - C. Substitutions: Under provisions of the General Requirements.

2.02 SUSPENSION SYSTEM MATERIALS

- A. Grid Materials: Commercial quality cold rolled steel with galvanized coating.
- B. Exposed Grid Surface Width: 15/16 inch.
- C. Grid Finish: White.
- D. Accessories: Stabilizer bars, clips, splices, edge moldings, hold down clips, and light protection hoods required for rated suspended grid systems.
- E. AXIOM Classic Edge trim. 4" extruded ceiling edge accent pieces. Straight and curved application.
- F. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

2.03 ACOUSTICAL UNIT MATERIALS

A. Acoustical Panels: ASTM E1264, conforming to the following:

1. Type I – Armstrong Fine Fissured, High CAC, High NRC, 2'x2'x7/8", Square Edge. Item No. 465, Non-Rated, Class A, Color White.

2. Type 2 – Armstrong Kitchen Zone, 2'x2'x5/8, Square Edge. Item No. 673, non-rated, Class A, Color White.

2.04 ACCESSORIES

- A. Touch-up Paint: Type and color to match acoustical and grid units.
- B. Extra Material: Provide one unopened carton of each ceiling type to the owner.

PART 3 EXCUTION

3.01 EXAMINATION

A. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - LAY-IN GRID SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and manufacturer's instructions and as supplemented in this section.
- C. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- D. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- E. Locate system on room axis according to reflected plan.
- F. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- G. Supply hangers or inserts for installation to Section with instructions for their correct placement.
- H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
- K. Do not eccentrically load system, or produce rotation of runners.
- L. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.
- M. Form expansion joints as required or detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.
- N. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with UL assembly requirements at fire rated ceiling assemblies at rated ceiling assemblies.
- O. Install support hangers at (4) four corners of recessed light fixtures.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.
- D. Install units after above ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.
- F. Cut tile to fit irregular grid and perimeter edge trim. Field rabbet tile edge. Double cut and field paint exposed edges of tegular units.
- G. Where bullnose concrete block corners or round obstructions occur, provide preformed closers to match edge molding.
- H. Install hold-down clips to retain panels tight to grid system as required to meet ratings.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base.

1.02 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical characteristics; sizes, patterns and colors available.
- B. Samples: Submit one sample, illustrating color and pattern for each floor material.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and seaming recommendations.

1.03 REGULATORY REQUIREMENTS

A. Conform to code for flame/smoke rating requirements in accordance with ASTM E84.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of the General Requirements.
- B. Protect roll materials from damage.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.
- 1.06 MAINTENANCE DATA
 - A. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- 1.07 EXTRA MATERIALS
 - A. Provide 10 lineal feet of base material specified.
 - B. Provide 60 sf of each type & color of flooring.

PART 2 PRODUCTS

- 2.01 MATERIALS Luxury Vinyl Tile and Plank Flooring
 - A. Vinyl Plank Flooring: ASTM F1700, J&J Timeless Series, color to be selected from manufacturer's full line.
 - 1. Size: +/-8" wide x 36" or greater minimum permissible length. Install staggered joints, random length.
 - 2. Thickness: 4.5 mm, Wear layer .020mil
 - Adhesives: Install using manufacturer recommended adhesives for 10 year warranty.
 a. Adhesive shall be type recommended and approved by the manufacturer for installation over subfloor with moisture content 98% or higher.
 - 4. Equivalent Products for Bidding Purposes
 - a. Shaw, Solitude, minimum 4.5mm thickness
 - b, Gerfloor, Creation Clic or equivalent product, minimum 4.5mm thickness.
- 2.02 MATERIALS BASE
 - A. Base: FS SS-W-40. Rubber; coved; premolded external corners only where mitering and bending of base is not possible or where returns are less than 4" long.
 - 1. Height: 4 inch
 - 2. Thickness: 1/8 inch thick
 - 3. Length: Roll. Strips are not acceptable. Maximum of 1 joint/seam on any wall.
 - 4. Manufacturers:
 - a) Roppe; Johnsonite; Tarkett Matte finish.

- 5. Color to be selected from manufacturer full range
- B. Base: Rubber; Non-cove at base of columns.
- 2.03 MATERIALS CUSHIONED SPORT FLOORING
- A. Sheet Flooring: ASTM F2772, Gerfloor, Taraflex/Rec 60 / Class 1 Fire Rating 1, color to be selected from manufacturer's full line of simulated wood finishes.
 - 1. Size: 72" wide x maximum permissible length.
 - 2. Thickness: 6.0mm., Wear layer .06"
 - 3. Adhesives: Install using manufacturer recommended adhesives for 10 year warranty and 5 year under bed warranty.
 - 4. Force Reduction Čushioning 27-33%.
 - 5. Moisture Mitigation System Install moisture mitigation for 92% RH (≤ 10lbs) using manufacturer's recommended system and method. Included in BASE BID.
 - 6. Equivalent Products for Bidding Purposes
 - a. Shaw, Rexcourt Cushioned Sport Flooring, 6.5mm., Class 2 Force Reduction Cushioning.
 - 7. Substitutions per provisions of General Conditions.

2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Edge Strips: Flooring material as approved. Transition strip shall be low profile type. Submit for approval.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify concrete floors are dry to a maximum moisture content of 7 percent, and exhibit negative alkalinity, carbonization, or dusting.
- B Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. The contractor and installer shall review existing floor condition. Existing carpet backing, adhesive residue, and any and all materials shall be thoroughly removed, cleaned, and prepped prior to any floor installation.
- C. The Contractor and installer shall include all cost for labor and material to prep, level, skim, grind, and any other measures to ensure level and stable subfloor prior to installing flooring to ensure that final floor installation is free of bumps, waves, and physical and/or aesthetic flaws in the installation.
- B. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer as recommended by manufacturer.

3.03 INSTALLATION - BASE

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units or "V" cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.04 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Install LVT to random pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- G. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
- H. Install resilient edge strips at unprotected or exposed edges, and where flooring terminates.

- I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- 3.05 CLEANING
 - A. Clean all work as described in the General Requirements.
 - B. Remove excess adhesive from floor, base, and wall surfaces without damage.
 - C. Clean, seal, and buff floors in accordance with manufacturer's instructions.

3.06 PROTECTION OF FINISHED WORK

- A. Protect finished Work.
 - B. Prohibit traffic on floor finish for 48 hours after installation.

CARPET TILE

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. Carpet placed with glue down method.
 - B. Accessories.

1.02 ALLOWANCES

- A. Cash Allowance: This contractor shall install and furnish all carpet.
 - Walk-off Carpet Type. This contractor shall allow the sum of <u>\$45.00 per square yard</u> for purchase and delivery of carpet only.
 - All other carpet areas: This contractor shall allow the sum of <u>\$32.00 per square yard</u> for purchase and delivery of carpet only.
- B. Allowance includes purchase and delivery of carpet only. Installation, glue, and accessories are included in the Contractors Bid price, **not** the allowance. Any differential in the allowance amount listed above and original invoices from the supplier will be adjusted in the contract price.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- B. Samples: Submit one sample illustrating color and pattern for each carpet material specified.
- C. Submit one sample of edge strip, material for each color specified.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing specified carpet with minimum three years documented experience.
- B. Installer: Company specializing in installing carpet with minimum three years documented experience and approved by manufacturer.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Store materials for 3 days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature 1 day prior to, during and 24 hours after installation.
- 1.06 MAINTENANCE DATA
 - A. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- 1.07 EXTRA MATERIAL
 - A. Provide 100 sq. ft. of carpeting of each type, color, and pattern specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - CARPETING

- A. J & J Industries or Invision
- B. Patcraft
- C. Lees
- D. Shaw Contract Group
- E. Substitutions: Under provisions of the General Requirements.

2.02 CARPET PRODUCTS

- A. <u>As selected by Architect. A variety of carpet types and styles may be used (i.e. actionbac, integral pad, tile, variety of colors, and variety of manufacturers)</u>. For bidding purposes; it is recommended that Installer figure labor involving greatest amount of work.
- B. It is anticipated that up to 5 carpet tile styles may be selected.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Adhesive: Compatible with carpet material and as Recommended by carpet manufacturer. Adhesive shall be type approved by the manufacturer for slab moisture content of 95% or higher.
- C. Edge Strips: Type, finish, color as selected.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/4 inch in 10 ft., and are ready to receive work.
- B. Verify concrete floors are dry to maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.

3.02 PREPARATION

- A. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Apply carpet and adhesive in accordance with manufacturer's instructions.
- B. Verify carpet match before cutting to ensure minimal variation between dye lots.
- C. Double cut carpet, to allow intended seam and pattern match. Make cuts straight, true, and unfrayed. Edge seam carpet at traffic areas.
- D. Locate seams in area of least traffic.
- E. Join seams by hot adhesive tape method. Form seams straight, not overlapped or peaked, and free of gaps.
- F. Lay carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance. Provide monolithic color, pattern, and texture match within any one area.
- G. Do not change run of pile in any room where carpet is continuous through a wall opening into another room. Locate change of color or pattern between rooms under door centerline.
- H. Cut and fit carpet around interruptions.
- I. Bind cut edges where not concealed by edge strips.
- J. Fit carpet tight to intersection with vertical surfaces without gaps.
- K. Where wall bases are scheduled, cut carpet tight to walls. Fit carpet tight to vertical interruptions, leaving no gaps.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and field application of paints and coatings.

1.2 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum years documented experience and approved by manufacturer.

1.3 DELIVERY, STORAGE, AND HANDLING

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

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.5 EXTRA MATERIALS

A. Provide one gallon of each color to owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer - Paint, Transparent Finishes, Stain, Primer Sealers, and Block Filler by SHERWIN- WILLIAMS or as approved equal.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

A. Refer to schedule at end of section for surface finish schedule.

- 3.1 EXAMINATION
 - A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
 - B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
 - C. Test shop applied primer for compatibility with subsequent cover materials.
- 3.2 PREPARATION
 - A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
 - B. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
 - C. Seal with shellac and seal marks which may bleed through surface finishes.
 - D. Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow surface to dry.
 - E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
 - F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
 - G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
 - H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
 - I. Copper Surfaces Scheduled for a Paint Finish: Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.
 - J. Copper Surfaces Scheduled for a Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.
 - K. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
 - L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
 - M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of trisodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
 - N. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
 - O. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand, power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
 - P. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - Q. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
 - R. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
 - S. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied.

- T. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.
- U. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease, and dirt.
- V. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.
- 3.3 APPLICATION
 - A. Apply products in accordance with manufacturer's instructions.
 - B. Do not apply finishes to surfaces that are not dry.
 - C. Apply each coat to uniform finish.
 - D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
 - E. Sand wood and metal lightly between coats to achieve required finish.
 - F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
 - G. Allow applied coat to dry before next coat is applied.
 - H. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
 - I. Prime concealed surfaces of interior and exterior woodwork with primer paint.
 - J. Prime concealed surfaces of interior woodwork scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with mineral spirits.

3.4 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars, and supports except where items are prefinished.
- C. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
- D. Paint exposed conduit and electrical equipment occurring in finished areas.
- E. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.5 CLEANING

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

3.6 SCHEDULE

The following are for exterior and interior surfaces, and are all products of Sherwin-Williams.

EXTERIOR SURFACES

- 1. WOOD
 - A. Flat Finish/Latex Base
 - 1st Coat: Exterior Wood Primer, B42W8041
 - 2nd Coat: A-100 Exterior Latex Satin A82 Series
 - 3rd Coat: A-100 Exterior Latex Satin A82 Series

2. FERROUS METAL

- A. Painted (Gloss Finish/Alkyd Base)
 - 1st Coat: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310
 - 2nd Coat: Waterbased Acrolon 100 Polyurethane Gloss, B65-700 Series
 - 3rd Coat: Waterbased Acrolon 100 Polyurethane Gloss, B65-700 Series

- 3. GALVANIZED and ALUMINUM METALS
 - A. Painted (Semi-Gloss Finish/Latex Base)
 - 1st Coat: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310
 - 2nd Coat: Pro Industrical Zero VOC Acrylic Semi-Gloss, B66 Series.
 - 3rd Coat: Pro Industrical Zero VOC Acrylic Semi-Gloss, B66 Series.
- 4. CONCRETE MASONRY UNITS
 - A. Painted (Flat Finish/Latex Base)
 - 1st Coat: Loxon Block Surfacer, A24W200
 - 2nd Coat: A-100 Exterior Latex Satin, A82 Series
 - 3rd Coat: A-100 Exterior Latex Satin, A82 Series
- 5. CONCRETE/BRICK
 - A. Painted (Flat Finish/Latex Base)
 - 1st Coat: Loxon Concrete and Masonry Primer, A24W8300
 - 2nd Coat: DuraCraft Exterior Latex Satin, C7 Series
 - 3rd Coat: DuraCraft Exterior Latex Satin, C7 Series
- 6. PLASTER/STUCCO/EIFS
 - A. Painted (Flat Finish/Latex Base)
 - 1st Coat: Loxon Concrete and Masonry Primer, A24W8300
 - 2nd Coat: A-100 Exterior Latex Satin, A82 Series
 - 3rd Coat: A-100 Exterior Latex Satin, A82 Series
- 7. TRAFFIC AND PARKING LINE MARKING
 - A. Painted (ProMar Traffic Marking Paint) 1st Coat: B29W1-WHITE

INTERIOR SURFACES

- 1. WOOD AND PLYWOOD
 - A. Painted (Eg-Shel Finish/Alkyd Base)
 - 1st Coat: ProMar 200 Zero VOC Primer, B28W2600
 - 2nd Coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 Series
 - 3rd Coat: Pro Industrial Zero VOC Acrylic Semi-Gloss, B66-650 Series
 - B. Stained and Varnished (Clear Finish) Opened Grained Wood
 - 1st Coat: Wood Classics, A49W800 Series
 - 2nd Coat: Wood Classics WB Polyurethane A68
 - 3rd Coat: Wood Classics WB Polyurethane A68

2. CONCRETE BLOCK (CMU)

- A. Painted (Semi-Gloss Finish/Epoxy Base)
 - 1st Coat: PrepRite® Block Filler, B25W25
- 2nd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC
 - 3rd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC

3. GLAZED TILE BLOCK (GTB)

- A. Painted (Semi-Gloss Finish/Epoxy Base)
 - 1st Coat: Extreme Bond Primer, B-51-W150
- 2nd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC
 - 3rd Coat: Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss, K46W051 VOC
- 4. GYPSUM WALLBOARD
 - A. Painted (Eg-Shel Finish/Latex Base)
 - 1st Coat: ProMar 200, Zero VOC Interior Latex Primer, B28W2600
 - 2nd Coat: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2650
 - 3rd Coat: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20W2650

5. FERROUS METAL

A. Painted (Gloss Finish/Alkyd Base)

1st Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310

2nd Coat: Pro Industrial Zero VOC Waterbased Epoxy Gloss, B73-300 Series

3rd Coat: Pro Industrial Zero VOC Waterbased Epoxy Gloss, B73-300 Series

NOTE: Doors and Frames to be sprayed. No brush/roller marks will be accepted.

6. GALVANIZED METAL

Α.

- A. Painted (Semi-Gloss Finish/Alkyd Base)
 - 1st Coat:Pro Industrial Pro-Cryl Universal Primer, B66-310 Series2nd Coat:Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series
 - 3rd Coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series NOTE: Doors and Frames to be sprayed. No brush/roller marks will be accepted.
- 7. CONCRETE FLOORS (SEALED)
 - Painted (Clear Acrylic Floor Finish)
 - 1st Coat:WR Meadows Tiah Acrylic Concrete Sealer, Solvent Based2nd Coat:WR Meadows Tiah Acrylic Concrete Sealer, Solvent Based
- 8. PRECAST CONCRETE WALL PANELS
 - A. Painted and Textured

1st Coat: SW Loxon Concrete and masonry primer-sealer A24W3300
 2nd Coat: SW Ultracrete A44W800 (Apply to Mfg recommended coverage).
 3rd&4th Coat:2 coats Pro Industrial Pre-Catalyzed Water Based Epoxy, Semi-Gloss K46W051 VOC

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior ADA Parking Sign.
 - 2. Allowance for additional interior signage
 - 3. Street Sign By Owner, not in this contract.

1.02 ALLOWANCES

- Cash Allowance: This contractor shall install and furnish the following signage types, and shall allow the sum of <u>\$10,000.00</u> for the purchase and delivery of such signage. Note. Signage identified in section 10850, Pin-Mounted Letters, shall be included in the Contractors base bid, and is not included in this allowance. Signage included in this allowance shall include:

 "Special identification, classroom, and restroom signage"
- B. Allowance includes purchase and delivery of only. Installation of such signage shall be included in the Contractor's Bid price (approximately 40 hours), not the allowance. Any differential in the allowance listed and the original invoices from suppliers will be adjusted in the contract price.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."
- 1.4 SUBMITTALS
 - A. Product Data: For each type of product indicated.
 - B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, and graphic elements, including tactile characters and Braille, and layout for each sign.
 - C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors.
 - D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque Casting: 6 inches (150 mm) square including border.
 - 2. Dimensional Characters: Full-size Samples of each type of dimensional character letter, number, and graphic element.
 - 3. Aluminum: For each form, finish, and color, on 6-inch- (150-mm-) long sections of extrusions and squares of sheet at least 4 by 4 inches (100 by 100 mm).
 - E. Sign Schedule: Use same designations indicated on Drawings.
 - F. Maintenance Data: For signs to include in maintenance manuals.
 - G. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 **PROJECT CONDITIONS**

- Weather Limitations: Proceed with installation only when existing and forecasted weather conditions A. permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.
- 1.7 COORDINATION
 - Coordinate placement of anchorage devices with templates for installing signs. A.

1.8 WARRANTY

- Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace A. components of signs that fail in materials or workmanship within specified warranty period. 1.
 - Failures include, but are not limited to, the following:
 - Deterioration of metal and polymer finishes beyond normal weathering. a
 - Deterioration of embedded graphic image colors and sign lamination. b.
 - Warranty Period: Five years from date of Substantial Completion. 2.

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by А. aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
 - Classrooms, Offices, & Restroom Tactile and Braille Signage: Per Allowance, Manufacturer's B. standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - Panel Material: **Opaque and translucent acrylic sheet**. 1.
 - Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm). 2.
 - Changeable sign inserts. 3.

2.2 ACCESSORIES

Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior A. installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansionbolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 FABRICATION

- General: Provide manufacturer's standard signs of configurations indicated. A.
 - Welded Connections: Comply with AWS standards for recommended practices in shop 1. welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
- 2.4 FINISHES. GENERAL
 - Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for A. recommendations for applying and designating finishes.
 - Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary В. protective covering before shipping.
 - Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable С. if they are within one-half of the range of approved Samples. Noticeable variations in the 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.

2.5 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy **and background** colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for **three** years for application intended.

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 work.
- B. Verify that items, including anchor inserts are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Fire extinguishers. (6 total), Cabinets 5 total, K Series Standard bracket 1 total.

1.2 SUBMITTALS

- A. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. LARSEN'S Architectural Series 2409-R3, Vertical Duo Door, baked enamel interior finish.
- B. Substitutions: Under provisions of the General Requirements.

2.2 EXTINGUISHERS

- A. Dry Chemical Type: Larsen's MP series MP5, Cast steel tank, with pressure gage.
- B. Wet Chemical Type (Kitchen); WC2 ½. K Class Fire Capacity.

2.3 CABINETS

- A. Interior Metal: Formed sheet steel, baked enamel box.
- B. Configuration: Semi-recessed type, exterior nominal dimensions of 27 1/2 inch high x 13 inch wide x 5 inch deep.
- C. Trim Type: Returned to wall surface, with 2 1/2 inch projection.
- D. Exterior Door and Trim: Stainless Steel, reinforced for flatness and rigidity; latch with vertical glass.
- E. Door Glazing: Glass, clear, 1/8 inch thick tempered.
- F. Cabinet Mounting Hardware: Appropriate to cabinet.

2.4 FABRICATION

- A. Form cabinet enclosure with right angle inside corners and seams. Formed trimand door stiles.
- B. Pre-drill for anchors.
- C. Hinge doors for 180 degree opening with continuous piano hinge. Provide roller type catch.
- D. Weld, fill, and grind components smooth.
- E. Glaze doors with resilient channel gasket glazing.
- F. Provide Six (6) Fire Rated Cabinet as indicated on Code Footprint plan

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 24 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.
- E. Verify exact location with Architect.

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

- 1.01 SECTION INCLUDES
 - A. Toilet and washroom accessories.
 - B. Grab bars.
 - C. Attachment hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. BOBRICK WASHROOM EQUIPMENT INC, BRADLEY CORPORATION, or ASI WASHROOM ACCESSORIES.
- B. Accessory manufacturers as scheduled. BOBRICK, BRADLEY, and ASI are approved manufacturers provided product is equivalent to scheduled item.
- C. Substitutions: Under provisions of the General Requirements.

2.02 FABRICATION

- A. Weld and grind joints of fabricated components, smooth.
- B. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion. Maintain surfaces without scratches or dents.
- C. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges. Form bar with 1 1/2 inches clear of wall surface. Knurl grip surfaces.
- D. Shop assemble components and package complete with anchors and fittings.
- E. Provide steel anchor plates, adapters, and anchor components for installation.

2.03 FINISHES

- A. Galvanizing: ASTM A123 to 1.25 oz./sq. yd. Galvanize ferrous metal and fastening devices.
- B. Chrome/Nickel Plating: ASTM B456, satin finish.
- C. Stainless Steel: No. 4 satin luster finish.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.

PART 3 EXECUTION

- 3.01 EXAMINATION
 - A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by the manufacturer.
 - B. Verify exact location of accessories for installation. Coordinate with ADA requirements.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation. Provide templates and rough-in measurements as required.
- 3.03 INSTALLATION
 - A. Install accessories in accordance with manufacturer's instructions and Americans with Disabilities Act. Also reference ANSI A117.1.
 - B. Install plumb and level, securely and rigidly anchored to substrate.

3.04 SCHEDULE

- A. Countertop Soap Dispenser, SD: Bobrick B-8221. Typical at all Restroom Vanity lavatories.
- B. Grab Bars, GB: Mount top of bars at 34-36" A.F.F Install 2-piece Grab Bar set at all Handicap toilet stalls. BOBRICK B-6806x36 & B-6806x42, (7 sets total).
 - 1. Located 1 grab bar set at each classroom water closet.
- C. Toilet Tissue Dispensers, TP: Bobrick B-273. Typical at all water closets (12 total).
- D. Paper Towel Dispenser: PTD. Bobrick B-4262 Surface Mounted type (19 total).
- E. Waste Receptacle: Waste Baskets by Owner.
- F. Mirrors, M: Install bottom on top of vanity backsplash. Mirrors to be provided by Glass contractor, Reference Section 08800.

BUILDING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building specialties shall be furnished and installed as shown and herein specified. Installation shall be in accordance with the respective manufacturer's instructions. Certain manufacturer's products have been selected as a basic standard, and reference to these products has been made. Other manufacturers' products of equal capacities and design characteristics may be used, if approved by the Architect prior to the Bidding. The Contractor shall submit for approval shop drawings or standard cuts and illustrations or a combination thereof showing all items he proposes to use.

1.02 INTERIOR BUILDING SIGNAGE

- A. Product: Best Signage Systems, Graphic Blast MP. Ease all front edges. Signage to be ¼" thick clear acrylic with a painted second surface. Raised font and pictogram/character color to be selected from full line. Braille to be type-2 domed at all signs. Font style to be selected from manufacturer's full range. Some signage will have window holders for paper insert for room identification. Approximate signage dimension 8" x 12" submit samples.
- B. Allowance: Contractor shall include in their bid an **allowance of \$10,000.00** for the purchase and delivery of interior building signage. Contractor shall include all labor and material associated with receiving and installation of signage in his base bid. Anticipated mounting method is assumed to be by double sided tape unless noted otherwise.

1.03 KNOX BOX

- A. Contact: Hillsboro Fire Department for specification and order forms.
- B. Product: Semi-recessed box.
- C. Quantity: 1-Total. Location to be as directed by the Hillsboro Fire Department.

1.04 FIBERGLASS REINFORCED PLASTIC PANELING

- A. Product Class A Minimum .090 thickness panel. Include Manufacturer's Aluminum molding at all corners, transitions, joints, and tops, bottoms, etc.
- B. Product shall be applied using manufacturer recommended adhesive and manufacturer recommended mechanical fasteners. Pre-drill rivet holes and silicone caulk prior to riveting.
- C. Product shall be as per: Marlite, Sanitary Wall Series, Full range of colors. Mechanical/Storage rooms
- D. Product shall be Marlite, Symmetrix Wall Series, Full range of color and pattern. All Food Service areas.
- E. Located at walls above base to Ceiling at **Kitchen 123 and Dishwashing 124**. Symmetrix series, Subway style, White.
- F. Located at entire perimeter of room to 4' A.F.F. at Janitor 133. Standard series.

1.05 CAST METAL LETTERS

- A. Manufacturer: Gemimi Incorporated, or equal. 1/2" thick cast metal letters with baked enamel finish (full range of color selection) and 3" metal threaded posts on back side of lettering for 1" offset mounting onto wall. This signage is <u>NOT to be included in the Signage Allowance per Section 01019</u>. All costs associated with installation of this signage shall be included in the Contractor's **Base Bid**.
 - 1. 12" tall letters to read: "Hillsboro". Font Modern Love. Offset pin-mounted.
 - 2. 6" tall letters to read: "Community Childcare Center" Font *Bank Gothic*. Offset pin-mounted. a. Letters to be ½" offset pin mounted to wall

1.06 WALL PROTECTION SYSTEMS

- A. Install C/S ACROVYN, surface mounted corner guards.
- B. BALCO or IPC corner guard will be considered equal.
- C. Colors as selected by Architect from manufacturer's full range Up to 4 colors selected.
- D. Corner Guards to have concealed fastener assembly.
 - a. Height: 48 inches tall (starting from top of base).
 - b. Use SSM-20 at gypsum board corners where indicated.

1.07 WALL AND CEILING ACCESS PANELS

- A. Flush Mounted, Non-Rated Wall Access Panels. For installation in a drywall and metal stud assembly. No exposed fasteners. Provide wallboard bead for flush to ceiling installation
- B. Product: JL Industries Model AT Gasketed Access Panel or equal. Size 16"x16".
- C. Specification Requirements.
 - Frame 16 ga. steel
 - Door 16 ga. steel
 - Finish Galvanized. Product shall be field painted at exposed areas.
 - Hinge Continuous type.
 - Latch Flush Compression Latch; Screwdriver operated cam lock.
- D. Locate as identified in field. For bidding purposes, provide 4 access panels.

1.08 CLIMBING WALL SYSTEMS

- A. Wall Mounted, Traverse style climbing wall including floor safety mats.
- B. Product: Everlast Climbing Magna Climbing Wall, 8'x20'. Magnet accepting wall.

www.everlastclimbing.com 1.800.476.7366

- C. Specification Requirements. Wall - 8'Hx10'L. 330 T-nuts min. Hand Holds - 100, route setting hand-holds. Finish - Granite appearance, magnet accepting material Floor Safety Mats - 3" Fire Retardant (Class C) mats with locking system for mounting to wall. Color to be selected from manufacturers full range. 6' tall, 20' total length.
 D. Provide all components for a complete, fully secured, and operational wall climbing system.
- 1.09 UNDER COUNTER REFRIGERATORS
 - A. Type 1 ADA Height Unit Haier Model #HEBF100BXS; to fit below 34" counter. Glass front, stainless steel door trim, 150 can capacity. Located at Kitchen 127 Coffee Bar. (1 total).
- 1.10 UNDER COUNTER ICE MAKER
 - A. Summit BIM 26H32 15"W Crescent Cube Undercounter Ice Machine 25 lbs/day, Water Cooled, No Drain Needed, 115v.
 - B. Equivalent model as submitted for approval.
- 1.11 ACOUSTICAL WALL AND CEILING PANELS
 - A. Manufacturer: GS Acoustics, aCapella Scores Wall Panels.
 - B. Located where indicated on drawings. Size as indicated on drawings. Panels to be 1/2" minimum thickness. Square edge typical at all panel edges. Reference drawings for **custom shapes**.
 - C. Provide all hardware and brackets for complete installation.
 - D. Product to be Class 1 Fire Rated, Flame/Smoke Spread 25/50.
 - E. Color to be selected from manufacturer's full range. 16 Colors to choose from, minimum. Multiple colors will be selected and installed in patterns/layouts as indicated on drawings. Substitutions must match closely the colors as indicated on drawings.
 - F. Suspended Clouds, shall be suspended with aircraft cable. Locate cable as necessary to support clouds. Minimum 4 per unit.

1.12 TACK WALL SYSTEM

- A. Tackboards Vinyl faced over manufacturers modular cork backing. Minimum 3/8 tackable, ½" total thickness. ASTM E 84, NFPA 255 Class A flame spread ratings. Vinyl face shall be wrapped at corners and adjacent panels abutted.
- B. Provide fixed Mounting Brackets as recommended/provided by manufacturer. Not glued to wall. Brackets to be located at corners and body of tack wall panel to prevent bowing of panels. Bottom of standards to start 24" A.F.F. Stand-alone tackboards may be fixed mounted with Manufacturer's standard brackets.
- C. Manufacturer Claridge Products Vinyl Fabricork, or equivalent product.
- D. Color to be selected from manufacture's standard color range.
- E. Quantity As indicated on drawings.

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Pipe, fittings, valves, and connections for sprinkler systems.
- 1.2 RELATED REQUIREMENTS
 - A. Section "Firestopping".
 - B. Section 729 Fire-Suppression Sprinkler Systems: Sprinkler systems design.
- 1.3 REFERENCE STANDARDS
 - A. ASME A112.18.1 Plumbing Supply Fittings; 2012.
 - B. ASME BPVC-IX Boiler and Pressure Vessel Code, Section IX Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.
 - C. ASME B16.1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.
 - D. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
 - E. ASME B16.4 Gray Iron Threaded Fittings: Classes 125 and 250; 2016.
 - F. ASME B16.9 Factory-Made Wrought Buttwelding Fittings; 2012.
 - G. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
 - H. ASTM A536 Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).
 - I. ASTM A795/A795M Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.
 - J. ASTM C592 Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2016.
 - K. ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
 - L. AWS D1.1/D1.1M Structural Welding Code Steel; 2015, with Errata (2016).
 - M. AWWA C105/A21.5 Polyethylene Encasement for Ductile-Iron Pipe Systems; 2010.
 - N. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings; 2012.
 - O. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2017.
 - P. AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast; 2017.
 - Q. AWWA C606 Grooved and Shouldered Joints; 2015.
 - R. NFPA 13 Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - S. UL (DIR) Online Certifications Directory; Current Edition.
 - T. UL 262 Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
 - U. UL 312 Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- 1.4 SUBMITTALS
 - A. See Division 1 Section Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.
 - C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Conform to UL, FM, and Warnock Hersey requirements.
- C. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

- 2.1 FIRE PROTECTION SYSTEMS
 - A. Sprinkler Systems: Conform work to NFPA 13.
 - B. Welding Materials and Procedures: Conform to ASME Code.

2.2 BURIED PIPING

- A. Steel Pipe: ASTM A53/A53M Schedule 40 or ASTM A795 Standard Weight, black, with AWWA C105 polyethylene jacket, or double layer, half-lapped polyethylene tape.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded; with double layer, half-lapped polyethylene tape.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
 - 3. Joints: Welded in accordance with AWS D1.1.
- B. Cast Iron Pipe: AWWA C151/A21.51.
 - 1. Fittings: AWWA C110, standard thickness.
 - 2. Joints: AWWA C111, rubber gasket.
 - 3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.3 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 Schedule 40, black.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 - 3. Malleable Iron Fittings: ASME B16.3, threaded fittings.
 - 4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - 5. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.

2.4 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
- B. Plastic, Sheet Metal, or Moisture-Resistant Fiber: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

- C. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Not required for wall hydrants for fire department connections or in drywall construction.
- E. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material conforming to ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.5 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.
 - 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 - 4. Glass reinforced plastic pressure end plates.

2.6 ESCUTCHEONS

- A. Material:
 - 1. Fabricate from nonferrous metal.
 - 2. Chrome-plated.
 - 3. Metals and Finish: Comply with ASME A112.18.
- B. Construction:
 - 1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
 - 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.
- 2.7 PIPE HANGERS AND SUPPORTS
 - A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 - B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
 - C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
 - E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
 - F. Vertical Support: Steel riser clamp.
 - G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.8 MECHANICAL COUPLINGS

- A. Manufacturers:
 - 1. Tyco Fire Protection Products; Grinnell G-Fire Figure 705 Grooved Flexible Couplings: www.tyco-fire.com/#sle.
 - 2. Viega LLC; MegaPress: www.viega.com/#sle.
- B. Rigid Mechanical Couplings for Grooved Joints:
 - 1. Dimensions and Testing: Comply with AWWA C606.
 - 2. Minimum Working Pressure: 300 psig.
 - 3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
 - 4. Housing Coating: Factory applied orange enamel.
 - 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.

6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel

2.9 GATE VALVES

- A. Up to and including 2 inches:
 - 1. Bronze body, bronze trim, rising stem, handwheel, solid wedge or disc, threaded ends.
- B. Over 2 inches:
 - 1. Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, handwheel, OS&Y, solid rubber covered bronze or cast iron wedge, flanged ends.
- C. Over 4 inches:
 - 1. Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

2.10 GLOBE OR ANGLE VALVES

- A. Up to and including 2 inches:
 - 1. Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable rubber disc, threaded ends, with backseating capacity repackable under pressure.
- B. Over 2 inches:
 - 1. Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.11 BUTTERFLY VALVES

- A. Bronze Body:
 - 1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.
- B. Cast or Ductile Iron Body
 - 1. Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and internal tamper switch rated 10 amp at 115 volt AC.

2.12 CHECK VALVES

- A. Up to and including 2 inches:
 - 1. Bronze body and swing disc, rubber seat, threaded ends.
- B. Over 2 inches:
 - 1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.
- C. 4 inches and Over:
 - 1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.13 DRAIN VALVES

- A. Compression Stop:
 - 1. Bronze with hose thread nipple and cap.
- B. Ball Valve:
 - 1. Brass with cap and chain, 3/4 inch hose thread.

PART 3 EXECUTION

- 3.1 PREPARATION
 - A. Ream pipe and tube ends. Remove burrs.
 - B. Remove scale and foreign material, from inside and outside, before assembly.
 - C. Prepare piping connections to equipment with flanges or unions.
- 3.2 INSTALLATION
 - A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

- B. The entire building shall be provided with a fire protection sprinkler system.
- C. Prepare design documents including shop drawings and hydraulic calculations in accordance with NFPA 13 and submit to Authority Having Jurisdiction for approval prior to installation. Design shall be performed by a licensed Professional Engineer.
- D. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- E. Install piping to conserve building space, to not interfere with use of space and other work. Piping to be held as high as possible to roof deck. Route piping through trusses where required to maximize available space.
- F. Piping shall be concealed where routed in finished spaces.
- G. ROUTING AND LOCATION OF EXPOSED SPRINKLER SYSTEM PIPING IN AREAS WITHOUT CEILINGS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO PREPARING FIRE PROTECTION PLANS.
- H. Group piping whenever practical at common elevations.
- I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- J. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- K. Pipe Hangers and Supports:
 - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 6. Support piping from top chord of bar joists. Support from deck or bottom chord is not acceptable.
- L. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- M. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 099000.
- N. Do not penetrate building structural members unless indicated.
- O. Provide sleeves when penetrating footings, floors, and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 - 1. Aboveground Piping:
 - a. Pack solid using mineral fiber conforming to ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch.
 - 2. All Rated Openings: Caulk tight with fire stopping material conforming to ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
 - 3. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- P. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.

- 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
- 3. Locate piping in center of sleeve or penetration.
- 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
- 5. Tighten bolting for a water-tight seal.
- 6. Install in accordance with manufacturer's recommendations.
- Q. Escutcheons:
 - 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 - 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
 - 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- R. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- S. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- T. Provide gate valves for shut-off or isolating service.
- U. Provide drain valves at main shut-off valves, low points of piping and apparatus.

3.3 CLEANING

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

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Pipe markers.
- C. Ceiling tacks.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

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

2.2 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Red.

2.3 PIPE MARKERS

- A. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- C. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- D. Color code as follows:
 - 1. Fire Quenching Fluids: Red with white letters.
- 2.4 CEILING TACKS
 - A. Description: Steel with 3/4 inch diameter color coded head.

PART 3 EXECUTION

- 3.1 PREPARATION
 - A. Degrease and clean surfaces to receive adhesive for identification materials.
- 3.2 INSTALLATION
 - A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
 - B. Install tags with corrosion resistant chain.
 - C. Install plastic pipe markers in accordance with manufacturer's instructions.
 - D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
 - E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
 - F. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

G. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.
SECTION 211300 FIRE SUPPRESSION SPRINKLERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. Dry-pipe sprinkler system.
- C. System design, installation, and certification.
- D. Fire department connections.
- 1.2 RELATED REQUIREMENTS
 - A. Section 210500 Common Work Results for Fire Suppression: Pipe, fittings, and valves.
 - B. Section 210548 Vibration and Seismic Controls for Fire Suppression Piping and Equipment.
 - C. Section 213000 Fire Pumps.
- 1.3 REFERENCE STANDARDS
 - A. FM P7825 Approval Guide; Factory Mutual Research Corporation; current edition.
 - B. ICC-ES AC01 Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
 - C. ICC-ES AC106 Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
 - D. ICC-ES AC193 Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
 - E. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
 - F. NFPA 1963 Standard for Fire Hose Connections; National Fire Protection Association; 2014.
 - G. UL (DIR) Online Certifications Directory; Current Edition.
 - H. UL 405 Fire Department Connection Devices; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Preinstallation Meeting: Convene one week before starting work of this section.
- 1.5 SUBMITTALS
 - A. See Division 1 Section Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
 - C. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation. Additionally, indicate general routing of piping for review by Architect. ROUTING AND LOCATION OF EXPOSED SPRINKLER SYSTEM PIPING IN AREAS WITHOUT CEILINGS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO PREPARING FIRE SPRINKLER PLANS.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 3. Submit shop drawings, product data, and hydraulic calculations to authority having jurisdiction for approval. Drawings and calculations shall be stamped by a licenced professional engineer.
 - 4. Installation shall be fully coordinated with structure and all other trades. Coordination shall be performed with installed conditions, not just the construction drawings. Rework of sprinkler piping due to conflicts with field conditions shall be performed without cost to the Owner, Architect or Engineer.

- D. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- E. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

- A. Maintain one copy of referenced design and installation standard on site.
- B. Conform to UL requirements.
- C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Kansas.
- D. Equipment and Components: Provide products that bear UL label or marking.
- E. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.8 EXTRA MATERIALS

- A. Provide extra sprinklers of type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
- B. Provide suitable wrenches for each sprinkler type.
- C. Provide metal storage cabinet located adjacent to alarm valve.

PART 2 PRODUCTS

- 2.1 SPRINKLER SYSTEM
 - A. Sprinkler System: Provide coverage for entire building.
 - B. Occupancy: Comply with NFPA 13.
 - C. Water Supply: Determine volume and pressure from water flow test data.
 - D. Interface system with building fire and smoke alarm system.
 - E. Provide fire department connections at locations coordinated with Fire Department.
 - F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.
 - G. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.

2.2 SPRINKLERS

- A. Suspended Ceiling Type: Concealed type with screw on cover plate.
 - 1. Finish: Enamel, color white.
 - 2. Escutcheon Plate Finish: Enamel, color white.
 - 3. Cover Plate Finish: White enamel.
 - 4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Standard upright type with guard.
 - 1. Finish: Enamel, color as selected.
 - 2. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

- C. Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate and guard.
 - 1. Finish: Enamel, color white.
 - 2. Escutcheon Plate Finish: Enamel, color white.
 - 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- D. Guards: Finish to match sprinkler finish.
 - 1. Provide guards at all heads in gymnasium.
 - 2. Provide guards at all heads installed below 8' AFF, and all areas without ceilings.
- 2.3 PIPING SPECIALTIES
 - A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
 - 1. Activate electric alarm.
 - 2. Test and drain valve.
 - 3. Replaceable internal components without removing valve from installed position.
 - B. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, accelerator, and with the following additional capabilities and features:
 - 1. Activate electric alarm.
 - 2. Test and drain valve.
 - 3. Externally resettable.
 - 4. Replaceable internal components without removing valve from installed position.
 - C. Test Connections:
 - 1. Backflow Preventer Test Connection:
 - a. Provide downstream of the backflow prevention assembly, listed hose valves with 2.5 inch National Standard male hose threads with cap and chain.
 - b. Furnish one valve for each 250 gpm of system demand or fraction thereof.
 - D. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.
 - E. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
 - F. Fire Department Connections:
 - Type: Flush, wall mount made of corrosion resistant metal complying with UL 405.
 - a. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
 - b. Configuration: Horizontal.
 - c. Finish: Chrome.
 - d. Signage: Raised or engraved lettering 1 inch minimum indicating system type.
- 2.4 AIR COMPRESSOR

1.

- A. Compressor: Single unit, electric motor driven, motor, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.
- B. Electrical Characteristics:
 - 1. 1/3 hp. (Contractor to verify)
 - 2. 120 volts, single phase, 60 Hz.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Provide dry heads where subject to freezing.
- D. Provide approved backflow preventer assembly at sprinkler system water source connection.

- E. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- F. Locate outside alarm gong on building wall.
- G. Place pipe runs to minimize obstruction to other work.
- H. Place piping in concealed spaces above finished ceilings.
- I. Provide maximum separation between sprinkler piping and outside air intake or relief louvers.
- J. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- K. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- L. Install air compressor on vibration isolators. Refer to Section 210548.
- M. Flush entire piping system of foreign matter.
- N. Install guards on sprinklers in areas without ceilings.
- O. Hydrostatically test entire system.
- P. Required tests to be witnessed by authority having jurisdiction.
- 3.2 INTERFACE WITH OTHER PRODUCTS
 - A. Ensure required devices are installed and connected as required to fire alarm system.

SECTION 220501 PLUMBING DEMOLITION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Plumbing demolition.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field measurements, pipe, and equipment arrangements for new work as shown on Drawings.
- B. Prior to submitting bid, visit site and become familiar with scope of demolition work required to accommodate new work.
- C. Refer to Architectural Drawings for additional clarification of scope of demolition and new work.
- D. Verify that abandoned equipment and associated plumbing installation serve only abandoned facilities.
- E. Demolition drawings are based on record drawings and casual field observation .
- F. Report discrepancies to Architect before disturbing existing installation.
- G. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Remove all piping, fixtures, and other plumbing installation from entire building.
- B. Coordinate utility service outages with respective utility company.
- C. Provide temporary connections as required to maintain existing systems in service during construction.
- D. Restore services to items not being removed, but affected by the demolition work required for new construction.
- 3.3 DEMOLITION OF EXISTING PLUMBING WORK
 - A. Remove, relocate, and extend existing installations to accommodate new construction.
 - B. Remove all equipment, controls, piping, fixtures, and other plumbing installation from the project areas as required for new construction. Piping to be removed to source of supply.
 - C. Repair adjacent construction and finishes damaged during demolition and extension work.
 - D. Maintain access to existing installations that remain active. Modify installation or provide access panels as appropriate.
 - E. Extend existing installations using materials and methods compatible with existing installation or as specified.
- 3.4 CLEANING AND REPAIR
 - A. Clean and repair existing materials and equipment that remain or that are to be reused.

SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.
- 1.2 REFERENCE STANDARDS
 - A. ASME B40.100 Pressure Gauges and Gauge Attachments; 2013.
 - B. ASTM E1 Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
 - C. ASTM E77 Standard Test Method for Inspection and Verification of Thermometers; 2014, with Editorial Revision (2017).
 - D. UL 393 Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.1 PRESSURE GAGES

- A. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi.

2.2 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.3 STEM TYPE THERMOMETERS

- A. Thermometers Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Accuracy: 2 percent, per ASTM E77.
 - 4. Calibration: Degrees F.
- B. Thermometers Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Accuracy: 2 percent, per ASTM E77.
 - 4. Calibration: Degrees F.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

3.2 SCHEDULES

- A. Pressure Gages, Location and Scale Range:
 - 1. Domestic water service entrance, 0 to 100 psi
- B. Stem Type Thermometers, Location and Scale Range:

 Domestic hot water supply and recirculation, 100 to 200 degrees F. END OF SECTION 220519

SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other plumbing work.
- 1.2 RELATED REQUIREMENTS
 - A. Section 033000 Cast-in-Place Concrete: Concrete equipment pads.
- 1.3 REFERENCE STANDARDS
 - A. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
 - B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
 - C. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
 - D. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
 - E. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
 - F. MFMA-4 Metal Framing Standards Publication; 2004.
 - G. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- 1.6 QUALITY ASSURANCE
 - A. Comply with applicable building code.
- PART 2 PRODUCTS
- 2.1 SUPPORT AND ATTACHMENT COMPONENTS
 - A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.

- 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
- 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems:
 - 1. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 2. Comply with MFMA-4.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- D. Thermal Insulated Pipe Supports:
 - 1. General Construction and Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
 - d. Insulation inserts to consist of polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
 - 2. PVC Jacket:
 - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
 - b. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
 - c. Thickness: 60 mil.
- E. Non-Penetrating Rooftop Supports for Low-Slope Roofs:
 - 1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 - 3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.

- 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to stude to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.

SECTION 220553 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Nameplates.
 - B. Tags.
 - C. Pipe Markers.
 - D. Ceiling tacks.
- 1.2 REFERENCE STANDARDS
 - A. ASME A13.1 Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- 1.3 SUBMITTALS
 - A. See Division 1 Section Administrative Requirements, for submittal procedures.
 - B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
 - C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
 - D. Product Data: Provide manufacturers catalog literature for each product required.
 - E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.
- 2.2 TAGS
 - A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
 - B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
 - C. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- 2.4 CEILING TACKS
 - A. Description: Steel with 3/4 inch diameter color coded head.
 - B. Color code as follows:
 - 1. Plumbing Valves: Green.

PART 3 EXECUTION

3.1 INSTALLATION

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

- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Identify equipment with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- H. Identify control panels and major control components outside panels with plastic nameplates.
- I. Identify valves in main and branch piping with tags.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Locate ceiling tacks to locate valves above lay-in panel ceilings. Locate in corner of panel closest to equipment.

SECTION 220719 PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 REFERENCE STANDARDS

- A. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- B. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- C. ASTM C449 Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- D. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
- E. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation; 2017.
- F. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- G. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- H. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- I. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.
- 1.4 QUALITY ASSURANCE
 - A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of experience.
 - B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- 1.6 FIELD CONDITIONS
 - A. Maintain ambient conditions required by manufacturers of each product.
 - B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- 2.2 GLASS FIBER
 - A. Manufacturers:
 - 1. Knauf Insulation: www.knaufusa.com.

- 2. Johns Manville Corporation: www.jm.com.
- 3. Owens Corning Corp: www.owenscorning.com.
- 4. CertainTeed Corporation: www.certainteed.com.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum service temperature: 250 degrees F.
 - 3. Maximum moisture absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum service temperature: 250 degrees F.
 - 3. Maximum moisture absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Vapor Barrier Lap Adhesive:
 - 1. Compatible with insulation.
- F. Insulating Cement/Mastic:
 - 1. ASTM C195; hydraulic setting on mineral wool.
- G. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5x5.
- H. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- I. Insulating Cement:
 - 1. ASTM C449/C449M.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Armacell LLC: www.armacell.us/#sle.
 - 2. K-Flex USA: www.kflexusa.com.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534 Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: -40 degrees F.
 - 2. Maximum Service Temperature: 220 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETS

A. PVC Plastic.

1.

- Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Inserts and Shields:
 - 1. Application: Piping 2-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
- G. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Firestopping Section.
- H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.

3.3 SCHEDULES

1.

- A. Domestic Cold Water:
 - 1. Glass Fiber Insulation:
 - a. Pipe Size Range: 1/2 through 1-1/4 inch.
 - b. Thickness: 1/2 inch.
 - 2. Glass Fiber Insulation:
 - a. Pipe Size Range: Above 1-1/4 inch
 - b. Thickness: 1 inch
- B. Domestic Hot, and Recirculated Hot Water:
 - Glass Fiber Insulation:
 - a. Pipe Size Range: 1/2 through 1-1/4 inch.
 - b. Thickness: 1 inch.
- C. Roof Drain Bodies: 1" thick glass fiber
- D. Roof Drainage Above Grade: 1" thick glass fiber. Omit in vertical runs concealed in walls if available space does not allow installation of insulation.
- E. Other Systems:
 - 1. Drains from water coolers: 1/2" elastomeric

SECTION 221005 PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Gas.
 - 4. Flanges, unions, and couplings.
 - 5. Pipe hangers and supports.
 - 6. Valves.
 - 7. Flow controls.
 - 8. Check.
 - 9. Water pressure reducing valves.
 - 10. Relief valves.
 - 11. Sleeves
 - 12. Sleeve seals
 - 13. Grout
 - 14. Escutcheons
- 1.2 RELATED REQUIREMENTS
 - A. Section Firestopping.
 - B. Section 220553 Identification for Plumbing Piping and Equipment.
 - C. Section 220719 Plumbing Piping Insulation.

1.3 REFERENCE STANDARDS

- A. ANSI Z21.22 American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 2015.
- B. ANSI Z223.1 National Fuel Gas Code; 2016.
- C. ASME B16.3 Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- D. ASME B16.18 Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- F. ASME B31.1 Power Piping; 2016.
- G. ASME B31.9 Building Services Piping; 2014.
- H. ASSE 1003 Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.
- I. ASTM A53/A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.
- J. ASTM A74 Standard Specification for Cast Iron Soil Pipe and Fittings; 2017.
- K. ASTM A234/A234M Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2017.
- L. ASTM B32 Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- M. ASTM B42 Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.
- N. ASTM B88 Standard Specification for Seamless Copper Water Tube; 2016.
- O. ASTM B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- P. ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.

- Q. ASTM C564 Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- R. ASTM D2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.
- S. ASTM D2665 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- T. ASTM D2729 Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
- U. ASTM D2855 Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- V. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2017.
- W. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems; 2011a.
- X. ASTM F708 Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- Y. ASTM F 2389-06 Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
- Z. CSA B137.11 Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- AA. NSF/ANSI 14 Plastic Piping System Components and Related Materials
- AB. NSF/ANSI 61 Drinking Water Systems Components Health Effects
- AC. AWWA C550 Protective Interior Coatings for Valves and Hydrants; 2017.
- AD. AWWA C651 Disinfecting Water Mains; 2014.
- AE. CISPI 301 Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009 (Revised 2012).
- AF. CISPI 310 Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011 (Revised 2012).
- AG. ICC-ES AC01 Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- AH. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- AI. MSS SP-67 Butterfly Valves; 2017.
- AJ. MSS SP-70 Cast Iron Gate Valves, Flanged and Threaded Ends; 2011.
- AK. MSS SP-71 Cast Iron Swing Check Valves, Flanged and Threaded Ends; 2011, with Errata (2013).
- AL. MSS SP-78 Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
- AM. MSS SP-80 Bronze Gate, Globe, Angle and Check Valves; 2013.
- AN. MSS SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AO. NSF 372 Drinking Water System Components Lead Content; 2016.
- AP. PPI TR-4 PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe; 2017.
- 1.4 SUBMITTALS
 - A. See Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
 - C. Project Record Documents: Record actual routing of piping. Record actual locations of valves.
- 1.5 QUALITY ASSURANCE
 - A. Perform Work in accordance with City of Hillsboro standards.

- B. Where joining systems specific to a piping manufacturer are used, personnel shall receive factory authorized training prior to installation, and submit evidence of such training for review.
- C. Valves: Manufacturer's name and pressure rating marked on valve body.
- D. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- E. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- F. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- 1.6 REGULATORY REQUIREMENTS
 - A. Perform Work in accordance with State of Kansas, plumbing code.
 - B. Conform to applicable code for installation of backflow prevention devices.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
 - B. Provide temporary protective coating on cast iron and steel valves.
 - C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
 - D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- 1.8 FIELD CONDITIONS
 - A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

- 2.1 GENERAL REQUIREMENTS
 - A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
 - B. Reference PART 3 EXECUTION for product applications. Listing of products herein does not imply acceptance of use in all sizes or locations.
- 2.2 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING
 - A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
 - B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- 2.3 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING
 - A. Cast Iron Pipe: ASTM A74 extra heavy weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
 - B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- 2.4 SANITARY SEWER PIPING, ABOVE GRADE
 - A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
 - B. PVC Pipe: ASTM D2729.
 - 1. Fittings: PVC.

- 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- 2.5 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING
 - A. Copper Pipe: ASTM B42, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B 32, alloy Sn95 solder.
 - B. PE Pipe: ASTM D2239, or ASTM D2447 Schedule 40.
 - 1. Fittings: ASTM D2609, PE.
 - 2. Joints: Mechanical with stainless steel clamp.
- 2.6 WATER PIPING, ABOVE GRADE
 - A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. Manufacturers:
 - a. Uponor, Inc: www.uponorengineering.com/#sle.
 - b. Viega LLC: www.viega.com/#sle.
 - 2. PPI TR-4 Pressure Design Basis:
 - a. 100 psig at maximum 180 degrees F.
 - 3. Fittings: Brass and copper.
 - C. Polypropylene Pipe: Pipe shall be manufactured from a PP-R or PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipe shall be made in a multi-layer extrusion process. Domestic hot water shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389. All pipe shall be certified by NSF International as complying with NSF 14, NSF 61, and ASTM F 2389 or CSA B137.11.
 - 1. Pipe shall be Niron Clima Pipe as manufactured by Nupi Americas or equivalent approved by Engineer.
 - 2. Fittings shall be manufactured from a PP-R or PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All fittings shall be certified by NSF International as complying with NSF 14, NSF 61, and ASTM F 2389 or CSA B137.11.
 - 3. Valves shall be manufactured from resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The valves shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
 - 4. Manufacturer shall warrantee pipe and fittings for 30 years to be free of defects in materials or workmanship. Warrantee shall cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system do to defects in materials or workmanship.
 - D. Mechanical joint system: Manufacturer's fittings and joining methods, for pipe materials and sizes.
 1. Viega ProPress
- 2.7 NATURAL GAS PIPING, ABOVE GRADE
 - A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.
 - B. Mechanical joint system: Manufacturer's fittings and joining methods, for pipe materials and sizes.
 - 1. Viega Mega-Press

- 2.8 FLANGES, UNIONS, AND COUPLINGS
 - A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
 - B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.9 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping Drain, Waste, and Vent:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
 - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 7. Vertical Support: Steel riser clamp.
- C. Plumbing Piping Water:
 - 1. Conform to ASME B31.9.
 - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 - 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 - 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 - 5. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 - 6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
 - 7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 - 9. Vertical Support: Steel riser clamp.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 2. Other Types: As required.

2.10 GATE VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Conbraco Industries: www.conbraco.com.
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up To and Including 3 Inches:
 - 1. 1, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder ends.
- C. 2 Inches and Larger:
 - 1. 1, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.11 BALL VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Conbraco Industries: www.conbraco.com.
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

2.12 PLUG VALVES

A. Construction 2-1/2 Inches and Larger: 1, 175 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.13 BUTTERFLY VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Hammond Valve: www.hammondvalve.com.
 - 3. Crane Co.: www.cranevalve.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Construction 1-1/2 Inches and Larger: MSS SP-67, 200 psi CWP, cast or ductile iron body, nickel-plated ductile iron disc, resilient replaceable EPDM seat, wafer ends, extended neck, 10 position lever handle.
- C. Provide gear operators for valves 8 inches and larger, and chain-wheel operators for valves mounted over 8 feet above floor.

2.14 FLOW CONTROLS

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Griswold Controls: www.griswoldcontrols.com.
 - 4. Taco, Inc: www.taco-hvac.com.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.15 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Hammond Valve: www.hammondvalve.com.
 - 3. Nibco, Inc: www.nibco.com.
 - 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Up to 2 Inches:
 - 1. 1, Class 125, bronze body and cap, bronze swing disc with rubber seat, solder ends.
- C. Over 2 Inches:
 - 1. 1, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged or grooved ends.

2.16 SPRING LOADED CHECK VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Hammond Valve: www.hammondvalve.com.
 - 3. Crane Co.: www.cranevalve.com.

- 4. Milwaukee Valve Company: www.milwaukeevalve.com.
- B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.17 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com.
 - 2. Cla-Val Co: www.cla-val.com.
 - 3. Watts Regulator Company: www.wattsregulator.com.
- B. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- C. Over 2 Inches:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.18 RELIEF VALVES

2.19 RELIEF VALVES

- A. Temperature and Pressure Relief:
 - 1. Manufacturers:
 - a. Cla-Val Co: www.cla-val.com.
 - b. Henry Technologies: www.henrytech.com.
 - c. Watts Regulator Company: www.wattsregulator.com.
 - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.20 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.21 SLEEVE-SEAL SYSTEMS

- 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:
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Carbon steel.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.22 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.23 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

- D. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, exposed-rivet hinge, and spring-clip fasteners.

PART 3 EXECUTION

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

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Provide support for utility meters in accordance with requirements of utility companies.
- L. TRENCHING
 - 1. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
 - 2. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
 - 3. Do not interfere with 45 degree bearing splay of foundations.
 - 4. Cut trenches wide enough to allow inspection of installed utilities.
 - 5. Hand trim excavations. Remove loose matter.
 - 6. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
 - 7. Remove excavated material that is unsuitable for re-use from site.
 - 8. Remove excess excavated material from site.
- M. BACKFILLING
 - 1. Utilize Sand Fill. Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
 - 2. Fill up to subgrade elevations unless otherwise indicated.
 - 3. Employ a placement method that does not disturb or damage other work.
 - 4. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
 - 5. Maintain optimum moisture content of fill materials to attain required compaction density.
- N. Install bell and spigot pipe with bell end upstream.
- O. Install valves with stems upright or horizontal, not inverted.

- P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- Q. Install water piping to ASME B31.9.
- R. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- S. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- T. Do not use PVC piping in return air plenums.
- U. PP Piping: Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting type. All fusion-well joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
- V. The use of PEX piping shall be limited to 1" and smaller unless noted otherwise.
- W. SLEEVE INSTALLATION
 - 1. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
 - 2. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - a. Sleeves are not required for core-drilled holes.
 - 3. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - a. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - b. Cut sleeves to length for mounting flush with both surfaces.
 - 1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - c. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
 - 4. Install sleeves for pipes passing through interior partitions.
 - a. Cut sleeves to length for mounting flush with both surfaces.
 - b. Install sleeves that are large enough to provide 1/4-inchannular clear space between sleeve and pipe or pipe insulation.
 - c. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in other sections.
 - 5. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in other sections.
- X. SLEEVE-SEAL-SYSTEM INSTALLATION
 - 1. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
 - 2. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.
- Y. ESCUTCHEONS
 - 1. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
 - 2. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - a. Escutcheons Schedule:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.

- 4) Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
- 5) Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.
- 6) Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.

Z. Inserts:

- 1. Provide inserts for placement in concrete formwork.
- 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
- AA. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 7. Provide copper plated hangers and supports for copper piping.
 - 8. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 220548.
 - 9. Support cast iron drainage piping at every joint.

3.4 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Provide spring loaded check valves on discharge of water pumps.
- E. Provide flow controls in water recirculating systems where indicated.

3.5 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
- 3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM
 - A. Prior to starting work, verify system is complete, flushed and clean.
 - B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
 - C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
 - D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
 - E. Maintain disinfectant in system for 24 hours.
 - F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
 - G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
 - H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.7 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum hanger spacing: 6.5 ft.
 - 2) Hanger rod diameter: 3/8 inches.
 - b. Pipe size: 1-1/2 inches to 2 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 3/8 inch.
 - c. Pipe size: 2-1/2 inches to 3 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 1/2 inch.
 - d. Pipe size: 4 inches to 6 inches:
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 5/8 inch.
 - 2. Plastic Piping:
 - a. All Sizes:
 - 1) Maximum hanger spacing: 6 ft.
 - 2) Hanger rod diameter: 3/8 inch.
- B. Pipe Materials:
 - 1. Domestic Water:
 - a. Basis of design is copper. If PEX is used, sizes shall be adjusted to provide equivalent hydraulic diameter.
 - b. Stubouts to fixtures shall be copper.
 - c. Pipe sizes 1/2" to 1": Any material listed for use in Part 2.
 - d. Pipe sizes 1-1/4" and larger: Any material listed for use in Part 2, except PEX is not acceptable.
 - Sanitary Drain and Vent: Any material listed for use in Part 2.
 a. PVC shall not be used in return air plenums.
 - 3. Natural Gas: Any materials listed for use in Part 2.

SECTION 221006 PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cleanouts.
- B. Hose bibbs.
- C. Hydrants.
- D. Washing machine boxes and valves.
- E. Water hammer arrestors.
- F. Mixing valves.
- 1.2 REFERENCE STANDARDS
 - A. ASSE 1011 Hose Connection Vacuum Breakers; 2004.
 - B. ASSE 1012 Backflow Preventer with Intermediate Atmospheric Vent; 2009.
 - C. ASSE 1019 Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
 - D. PDI-WH 201 Water Hammer Arresters; 2010.

1.3 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

PART 2 PRODUCTS

2.1 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com/#sle.
 - 4. Sioux Chief Manufacturing.
- B. Cleanouts at Exterior Surfaced Areas:
 - 1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Exterior Unsurfaced Areas:
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- D. Cleanouts at Interior Finished Floor Areas (FFCO):
 - 1. Lacquered cast iron body with anchor flange, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- E. Cleanouts at Interior Finished Wall Areas (FWCO):
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- F. Cleanouts at Interior Unfinished Accessible Areas: Caulked or threaded type.

2.2 HOSE BIBBS

- A. Interior Hose Bibbs:
 - 1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, with handwheel, integral vacuum breaker in conformance with ASSE 1011.

2.3 HYDRANTS

A. Wall Hydrants:

1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, lockshield and removable key, and integral vacuum breaker.

2.4 WASHING MACHINE BOXES AND VALVES

- A. Box Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.
 - 2. Oatey: www.oatey.com/#sle.
- B. Valve Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.

2.5 ICE MAKER VALVE AND RECESSED BOX

- A. Box Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.
 - 2. Oatey: www.oatey.com/#sle.
- B. Valve Manufacturers:
 - 1. IPS Corporation/Water-Tite: www.ipscorp.com/#sle.

2.6 BACKFLOW PREVENTERS

- A. Manufacturers:
 - 1. Conbraco Industries: www.conbraco.com/#sle.
 - 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com.
- B. Reduced Pressure Backflow Preventers:
 - 1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.7 DOUBLE CHECK VALVE ASSEMBLIES

- A. Manufacturers:
 - 1. Conbraco Industries: www.conbraco.com/#sle.
 - 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 - 3. Zurn Industries, Inc: www.zurn.com/#sle.
- B. Double Check Valve Assemblies:
 - 1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.8 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Sioux Chief Manufacturing
- B. Water Hammer Arrestors:
 - 1. Stainless steel or Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.9 MIXING VALVES

- A. Thermostatic Mixing Valves:
 - 1. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
 - 2. Accessories:
 - a. Check valve on inlets.
 - b. Volume control shut-off valve on outlet.
 - c. Stem thermometer on outlet.
 - d. Strainer stop checks on inlets.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur.
- F. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors on cold water supply piping to flush valve or solenoid operated fixtures. . Install as recommended by hammer arrestor manufacturer.
- H. Install cleanouts at locations required by the International Plumbing Code (IPC), whether or not specifically indicated on the drawings. Such locations include, but are not limited to the following:
 - 1. Base of waste or soil stacks.
 - 2. Junction of building drain and building sewer (utilize 2-way cleanout at this location).

SECTION 224000 PLUMBING FIXTURES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Fixtures
- 1.2 REFERENCE STANDARDS
 - A. ASHRAE Std 18 Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.
 - B. ASME A112.6.1M Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).
 - C. ASME A112.18.1 Plumbing Supply Fittings; 2012.
 - D. ASME A112.19.2 Ceramic Plumbing Fixtures; 2013.
 - E. ASME A112.19.3 Stainless Steel Plumbing Fixtures (Designed for Residential Use); 2008 (R2013).
 - F. ASME A112.19.5 Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2011.

1.3 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Faucet Washers: Two sets of each type and size.
 - 2. Flush Valve Service Kits: Two for each type and size.
- 1.4 DELIVERY, STORAGE, AND HANDLING
 - A. Accept fixtures on site in factory packaging. Inspect for damage.
 - B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.5 WARRANTY

A. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

- 2.1 FIXTURES
 - A. Scheduled on drawings
 - B. Substitutions permitted, provided products are functionally and materially equivalent to those scheduled. Substitutions must be approved by Engineer in writing, prior to bidding. Requests for substitution must be received at least 5 work days prior to bidding.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
 - B. Verify that electric power is available and of the correct characteristics.
 - C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.
 - D. Reference Architectural drawings for exact locations of fixtures.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant, color to match fixture.

3.4 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean plumbing fixtures and equipment.

3.7 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

3.8 SCHEDULES

A. On Drawings
SECTION 230001 MECHANICAL DEMOLITION

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Mechanical demolition.

PART 2 PRODUCTS

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

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

4.1 EXAMINATION

- A. Verify field measurements, pipe, ductwork, and equipment arrangements for new work as shown on Drawings.
- B. Prior to submitting bid, visit site and become familiar with scope of demolition work required to accommodate new work.
- C. Refer to Architectural Drawings for additional clarification of scope of demolition and new work.
- D. Verify that abandoned equipment and associated mechanical installation serve only abandoned facilities.
- E. Demolition drawings are based on casual field observation .
- F. Should the contractor encounter any existing conditions related to the project area that prevent the work from being performed as indicated or described, contact the Architect immediately.
- G. Report discrepancies to Architect before disturbing existing installation.
- H. Beginning of demolition means installer accepts existing conditions.
- 4.2 DEMOLITION OF EXISTING MECHANICAL WORK
 - A. Remove existing installations as indicated on drawings and as required to accommodate new work.
 - B. Remove abandoned equipment, controls, air devices, ductwork, piping, fixtures, and other mechanical installation. Piping and ductwork to be removed to source of supply.
 - C. Repair adjacent construction and finishes damaged during demolition and extension work.
 - D. Maintain access to existing mechanical installations that remain active. Modify installation or provide access panels as appropriate.
- 4.3 CLEANING AND REPAIR
 - A. Clean and repair existing materials and equipment that remain or that are to be reused.

SECTION 230529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- A. Section 033000 Cast-in-Place Concrete: Concrete equipment pads.
- 1.2 REFERENCE STANDARDS
 - A. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
 - B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
 - C. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
 - D. MFMA-4 Metal Framing Standards Publication; 2004.
 - E. MSS SP-58 Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.4 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.5 QUALITY ASSURANCE

A. Comply with applicable building code.

PART 2 PRODUCTS

- 2.1 SUPPORT AND ATTACHMENT COMPONENTS
 - A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

- 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 2. Comply with MFMA-4.
 - 3. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.
- D. Steel Cable:

1.

- Manufacturers:
 - a. Ductmate Industries, Inc, a DMI Company; Clutcher Cable Hanging System: www.ductmate.com/#sle.
- E. Pipe Supports:
 - 1. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use expansion anchors or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.
 - 10. Powder-actuated fasteners are not permitted.
 - 11. Hammer-driven anchors and fasteners are not permitted.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install products in accordance with manufacturer's instructions.
 - B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
 - C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
 - D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
 - E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to stude to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

SECTION 230548

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof curbs.
- B. Vibration isolators.

1.2 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data:
- C. Product Data: Provide schedule of vibration isolator type with location and load on each.
- D. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Isolation Technology, Inc: www.isolationtech.com.
- B. Kinetics Noise Control, Inc: www.kineticsnoise.com/#sle.
- C. Mason Industries: www.mason-ind.com/#sle.

2.2 VIBRATION ISOLATORS

- A. Non-Seismic Type:
 - 1. All Elastomeric-Fiber Glass Pads:
 - a. Configuration: Flat or molded.
 - b. Thickness: 0.25 inch minimum.
 - c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
 - 2. Elastomeric Mounts:
 - a. Material: Oil, ozone, and oxidant resistant compounds.
 - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
 - 3. Steel Springs:
 - a. Assembly: Freestanding, laterally stable without housing.
 - b. Leveling Device: Rigidly connected to equipment or frame.
 - 4. Restrained Steel Springs:
 - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
 - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
 - 5. Elastomeric Hangers:
 - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
 - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
 - 6. Spring Hanger:
 - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
 - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
- 2.3 ROOF CURBS
 - A. Vibration Isolation Curbs:
 - 1. Non-Seismic Curb:

- a. Location: Between structure and rooftop equipment.
- b. Construction: Aluminum.
- c. Integral vibration isolation to conform to requirements of this section.

2.4 VIBRATION ISOLATORS

- A. Open Spring Isolators:
 - 1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 - 2. Spring Mounts: Provide with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 - 3. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
- B. Neoprene Pad Isolators:
 - 1. Rubber or neoprene waffle pads.
 - 2. Configuration: Single layer.
- C. Rubber Mount or Hanger: Molded rubber designed for 0.4 inch deflection with threaded insert.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- C. Support piping connections to equipment mounted on isolators using isolators or resilient hangers to nearest flexible pipe connector.

3.2 SCHEDULE

- A. Isolate equipment including but not limited to the following:
 - 1. Packaged Rooftop Units, Rooftop air handling units, Rooftop outside air units
 - a. Spring isolation curb

END OF SECTION 230548

230548 - 2

SECTION 230553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Nameplates.
 - B. Tags.
 - C. Adhesive-backed duct markers.
 - D. Pipe Markers.
 - E. Ceiling tacks.
- 1.2 REFERENCE STANDARDS
 - A. ASME A13.1 Scheme for the Identification of Piping Systems; 2015.

PART 2 PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Air Terminal Units: Tags.
- C. Automatic Controls: Tags. Key to control schematic.
- D. Control Panels: Nameplates.
- E. Dampers: Ceiling tacks, where located above lay-in ceiling.
- F. Ductwork: Nameplates.
- G. Heat Transfer Equipment: Nameplates.
- H. Instrumentation: Tags.
- I. Major Control Components: Nameplates.
- J. Piping: Pipe markers.
- K. Small-sized Equipment: Tags.
- L. Thermostats: Nameplates.
- 2.2 NAMEPLATES
 - A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
 - 3. Seton Identification Products: www.seton.com/#sle.
 - B. Letter Color: White.
 - C. Letter Height: 1/4 inch.
 - D. Background Color: Black.
- 2.3 TAGS
 - A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
 - 2. Brady Corporation: www.bradycorp.com/#sle.
 - 3. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
 - 4. Seton Identification Products: www.seton.com/#sle.
 - B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
 - C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

2.4 ADHESIVE-BACKED DUCT MARKERS

- A. Material: High gloss acrylic adhesive-backed vinyl film; printed with UV and chemical resistant inks.
- B. Style: Individual Label.
- C. Color: Yellow/Black.

2.5 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com/#sle.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
 - 3. MIFAB, Inc.: www.mifab.com/#sle.
 - 4. Seton Identification Products: www.seton.com/#sle.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.6 CEILING TACKS

- A. Manufacturers:
 - 1. Craftmark: www.craftmarkid.com/#sle.
- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
 - 1. HVAC Equipment: Yellow.
 - 2. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

- 3.1 PREPARATION
 - A. Degrease and clean surfaces to receive adhesive for identification materials.
- 3.2 INSTALLATION
 - A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
 - B. Install tags with corrosion resistant chain.
 - C. Install plastic pipe markers in accordance with manufacturer's instructions.
 - D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
 - E. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
 - F. Install ductwork with labels or stencilled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
 - G. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

SECTION 230593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.
- 1.2 RELATED REQUIREMENTS
- 1.3 REFERENCE STANDARDS
 - A. AABC MN-1 AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.
 - B. NEBB (TAB) Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).

1.4 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit to the Architect within two weeks after completion of testing, adjusting, and balancing.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 6. Units of Measure: Report data in I-P (inch-pound) units only.
 - 7. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC MN-1, AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
- E. TAB Supervisor Qualifications: Professional Engineer licensed in Kansas.

3.2 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.
- 3.3 PREPARATION
 - A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
 - B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
 - C. Provide additional balancing devices as required.

3.4 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 10 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 10 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.5 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities .
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- 3.7 SCOPE
 - A. Test, adjust, and balance the following:
 - 1. Packaged Roof Top Heating/Cooling Units.
 - 2. Fans
 - 3. Air Inlets and Outlets
- 3.8 MINIMUM DATA TO BE REPORTED
 - A. Electric Motors:
 - 1. Manufacturer
 - 2. Model/Frame
 - 3. HP/BHP
 - 4. Phase, voltage, amperage; nameplate, actual, no load
 - 5. RPM
 - 6. Service factor
 - 7. Starter size, rating, heater elements
 - 8. Sheave Make/Size/Bore
 - B. Packaged Rooftop Dedicated Outside Air Units:
 - 1. Location
 - 2. Manufacturer
 - 3. Model number
 - 4. Air flows, specified and actual
 - 5. Total static pressure (total external), specified and actual
 - 6. Entering energy exchange core outside air temperature (DB/WB)
 - 7. Entering energy exchange core return air temperature (DB/WB)
 - 8. Leaving energy exchange core supply air temperature (DB/WB)
 - 9. Leaving energy exchange core exhaust air temperature (DB/WB)

- 10. Sheave Make/Size/Bore.
- 11. Fan RPM.
- C. Air Distribution Tests:
 - 1. Room number/location
 - 2. Terminal type
 - 3. Design air flow
 - 4. Test (final) air flow
 - 5. Percent of design air flow

SECTION 230713 DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Duct insulation.
- B. Duct Liner.
- 1.2 RELATED REQUIREMENTS

1.3 REFERENCE STANDARDS

- A. ASTM C916 Standard Specification for Adhesives for Duct Thermal Insulation; 2014.
- B. ASTM C1071 Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.
- C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- D. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- E. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- F. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- G. ASTM C 1338 Fungi Resistance
- H. ASTM G 22 Bacterial Resistance
- 1.4 SUBMITTALS
 - A. See Division 1 Section Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
 - C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.
- 1.5 QUALITY ASSURANCE
 - A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
 - B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experienceand approved by manufacturer.
- 1.6 DELIVERY, STORAGE, AND HANDLING
 - A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
 - B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
- 1.7 FIELD CONDITIONS
 - A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
 - B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

- 2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION
 - A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 DUCT LINER

A. Manufacturers:

1. Armacell.

- B. Insulation material shall be a flexible, closed-cell or conformable, elastomeric insulation in sheet form: AP Armaflex AP Armaflex SA, and AP Coilflex. These products meets the requirements as defined in ASTM C 534, Grade 1 Type II, "Specification for preformed elastomeric cellular thermal insulation in sheet and tubular form".
 - 1. AP Armaflex and AP Armaflex SA insulation materials shall have a closed cell structure to prevent moisture from wicking and effectively retard heat gain to make it an efficient insulation. AP Coilflex has a conformable cell structure allowing it to be bent on a coil line brake for tight fit in the corners.
 - 2. Insulation materials shall be manufactured without the use of CFC's, HFC's or HCFC's. It shall be formaldehyde-free, low VOCs, fiber free, dust free and resist mold and mildew.
 - 3. The insulation material shall conform to meet the requirements as defined in ASTM C 1534, Standard "Specification for Flexible Polymeric Foam Sheet Insulation Used as a Thermal and Sound Adsorbing Liner for Duct Systems".
 - 4. Materials 2" thickness and below, shall have a flame spread index of less than 25 and a smoke developed index of less than 50 when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive and all materials shall pass simulated end-use fire tests.
 - 5. AP Armaflex and AP Armaflex SA materials shall have a maximum thermal conductivity of 0.25 Btu-in/h-ft2 °F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
 - 6. AP Armaflex and AP Armaflex SA materials shall have a maximum water vapor transmission of 0.05 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
 - 7. Materials shall have a maximum water absorption rate of 0.2% (%by volume), when tested in accordance with ASTM C 209.
 - 8. The material shall be manufactured under an independent third party supervision testing program covering the properties for fire performance, thermal conductivity and water vapor transmission.
 - 9. Materials must be approved for air plenums.
 - 10. Materials must meet NFPA 90A, NFPA 908 and UL 181 Class 1 specification.
 - 11. Materials must meet ASTM C 411. Materials to perform up to 250 degrees F.
 - 12. NRC rating 0.40 Test Method ASTM C 423 with ASTM E 795 Type A Mounting. All product except AP Coilflex. NRC rating on the AP Coilflex is 0.60 Test Method ASTM C 423 with ASTM E 795 Type A Mounting.
- C. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- D. Liner Fasteners: Galvanized steel, self-adhesive pad, impact applied, or welded with integral or press-on head.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Insulated ducts:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

- C. Duct and Plenum Liner Application:
 - 1. Install in accordance with manufacturer's installation instructions.
 - 2. Armaflex Sheet Insulation shall be adhered directly to clean. oil-free surfaces with a full cover age of Armaflex 520, 520 Black or Low VOC Spray Adhesive. Apply 520, 520 Black and Spray Adhesive to both the Armaflex surface and sheet metal.
 - 3. SA Armaflex sheet shall be applied directly to a clean, dry, oil-free surface.
 - 4. Ambient temperature for applications is between 40 degrees F and 100 degrees F.
 - 5. The skin side (smooth side) shall be exposed to the air stream.
 - 6. Butt-edge seams shall be adhered using Armaflex 520,or 520 Black Adhesive by the compression fit method to allow for expansion/contraction. Leave a 1/2" wide uncoated border at the butt edge seams on the duct surface and the insulation surface. Overlap the insulation 1/4" at the butt-edges and compress the edges into place. Apply Armaflex 520 or 520 Black. Allow 48 hours for full cure prior to operating system.
 - 7. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

- A. Supply ducts from air handlers with heating/cooling coils: Flexible glass fiber duct insulation, 1-1/2" thick.
 - 1. Omit duct wrap where duct liner is indicated.
 - 2. Omit duct wrap on exposed spiral ductwork.
 - 3. Omit duct wrap on supply ducts from dedicated outdoor air units.
- B. Transfer ducts between occupied spaces: Duct Liner, 1/2" thick.
- C. Supply and exhaust ducts within 10' of DOAS units: Duct Liner, 1/2" thick.

SECTION 230719 HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.
- C. Engineered wall outlet seals and refrigerant piping insulation protection.
- 1.2 RELATED REQUIREMENTS
 - A. Section 232113 Hydronic Piping: Placement of hangers and hanger inserts.
 - B. Section 232300 Refrigerant Piping: Placement of inserts.
- 1.3 REFERENCE STANDARDS
 - A. ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
 - B. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
 - C. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
 - D. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
 - E. ASTM C195 Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
 - F. ASTM C449 Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
 - G. ASTM C534/C534M Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.
 - H. ASTM C547 Standard Specification for Mineral Fiber Pipe Insulation; 2017.
 - I. ASTM C795 Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
 - J. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
 - K. ASTM E96/E96M Standard Test Methods for Water Vapor Transmission of Materials; 2016.
 - L. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- 1.4 SUBMITTALS
 - A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
 - B. Samples: Submit two samples of any representative size illustrating each insulation type.
 - C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.
- 1.6 DELIVERY, STORAGE, AND HANDLING
 - A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.7 FIELD CONDITIONS

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

PART 2 PRODUCTS

- 2.1 REGULATORY REQUIREMENTS
 - A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
- 2.2 GLASS FIBER
 - A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
 - B. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
 - C. Vapor Barrier Lap Adhesive: Compatible with insulation.
 - D. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
 - E. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5x5.
 - F. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
 - G. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
 - H. Insulating Cement: ASTM C449.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 2; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature: 350 degrees F.
 - 3. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
 - 1. Manufacturers:
 - a. Aeroflex USA, Inc; Aeroseal: www.aeroflexusa.com/#sle.

2.4 JACKETS

- A. PVC Plastic.
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.

- 3. Joining: Longitudinal slip joints and 2 inch laps.
- 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
- C. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
 - 1. Thickness: 0.010 inch.
 - 2. Finish: Smooth.
 - 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
- 2.5 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION
 - A. Manufacturers:
 - 1. Airex Manufacturing, Inc; ____: www.airexmfg.com/#sle.
 - B. Basis of Design: Airex Manufacturing, Inc; www.airexmfg.com/#sle.1. Pipe Penetration Wall Seal: Airex Titan Outlet.
 - C. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
 - 1. Outlet Cover Color: Gray.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature.
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Inserts and Shields:
 - 1. Application: Piping 2-1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert location: Between support shield and piping and under the finish jacket.
 - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section "Firestopping".

- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10' above finished floor): Finish with PVC jacket and fitting covers.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.3 SCHEDULE

- A. Cooling Systems:
 - 1. Condensate Drains from Cooling Coils: 1/2" glass fiber
 - 2. Refrigerant Piping: Per VRF Manufacturer recommendations

SECTION 232100

GENERAL REQUIREMENTS FOR HVAC PIPING

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. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.
 - 4. Escutcheons.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inchminimum thickness; round tube closed with welded longitudinal joint.
- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.
- 2.4 ESCUTCHEONS
 - A. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
 - B. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed or exposed-rivet hinge, and spring-clip fasteners.

PART 3 - EXECUTION

- 3.1 SLEEVE INSTALLATION
 - A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
 - B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
 - C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
 - D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inchannular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in other sections.
 - E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in other sections.
- 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION
 - A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
 - B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.
- 3.3 ESCUTCHEON INSTALLATION
 - A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
 - B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheon Schedule:
 - a. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.
 - b. Bare Piping in Equipment Rooms: One-piece, stamped-steel type or split-plate, stamped-steel type with exposed-rivet hinge.

SECTION 232113 HYDRONIC PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Equipment drains and overflows.
- B. Pipe hangers and supports.

PART 2 PRODUCTS

2.1 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- 2.2 EQUIPMENT DRAINS AND OVERFLOWS
 - A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - B. PVC Pipe: ASTM D1785, Schedule 40, or ASTM D2241, SDR 21 or 26.
 - 1. Fittings: ASTM D2466 or D2467, PVC.
 - 2. Joints: Solvent welded in accordance with ASTM D2855.

2.3 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- 2.4 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS
 - A. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 - 1. Dimensions and Testing: In accordance with AWWA C606.
 - 2. Mechanical Couplings: Comply with ASTM F1476.
 - 3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 - 4. When pipe is field grooved, provide coupling manufacturer's grooving tools.
 - B. Dielectric Connections:
 - 1. Waterways:
 - a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - b. Dry insulation barrier able to withstand 600 volt breakdown test.
 - c. Construct of galvanized steel with threaded end connections to match connecting piping.
 - d. Suitable for the required operating pressures and temperatures.
 - 2. Flanges:
 - a. Dielectric flanges with same pressure ratings as standard flanges.
 - b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
 - c. Dry insulation barrier able to withstand 600 volt breakdown test.
 - d. Construct of galvanized steel with threaded end connections to match connecting piping.
 - e. Suitable for the required operating pressures and temperatures.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Slope piping and arrange to drain at low points.

SECTION 232300 REFRIGERANT PIPING

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Piping.
 - B. Refrigerant.
 - C. Moisture and liquid indicators.
 - D. Valves.
 - E. Strainers.
 - F. Filter-driers.
- 1.2 REFERENCE STANDARDS
 - A. ASHRAE Std 15 Safety Standard for Refrigeration Systems; 2013.
 - B. ASHRAE Std 34 Designation and Safety Classification of Refrigerants; 2013.
 - C. ASME B16.22 Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
 - D. ASME B31.5 Refrigeration Piping and Heat Transfer Components; 2013.
 - E. ASTM B280 Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2016.
 - F. AWS A5.8M/A5.8 Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).
- 1.3 SUBMITTALS
 - A. See Section 013000 Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- PART 2 PRODUCTS
- 2.1 PIPING
 - A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
 - 3. Use of mechanical joints is not acceptable.
- 2.2 REFRIGERANT
 - A. Refrigerant: R-410A as defined in ASHRAE Std 34.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install refrigeration specialties in accordance with VRF System manufacturer's instructions.
 - B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
 - C. Install piping to conserve building space and avoid interference with use of space.
 - D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 - E. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - F. Flood piping system with nitrogen when brazing.

- G. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- H. Insulate piping and equipment; refer to Section and Section 230716.
- I. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

3.2 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 - 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
 - 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 5. 2-1/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 6. 2-5/8 inch OD: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 7. 3-1/8 inch OD: Maximum span, 10 feet; minimum rod size, 3/8 inch.
- B. Hanger Spacing for Steel Piping.
 - 1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 - 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 - 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 - 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.

SECTION 233100 HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Nonmetal ductwork.
- C. Duct cleaning.

1.2 RELATED REQUIREMENTS

- A. Section 230713 Duct Insulation: External insulation and duct liner.
- B. Section 233300 Air Duct Accessories.
- C. Section 233600 Air Terminal Units.
- D. Section 233700 Air Outlets and Inlets.
- E. Section 230593 Testing, Adjusting, and Balancing for HVAC.

1.3 REFERENCE STANDARDS

- A. ASHRAE (FUND) ASHRAE Handbook Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A240/A240M Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.
- D. ASTM A480/A480M Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2017.
- E. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
- F. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- G. ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- H. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
- I. ICC-ES AC01 Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.
- J. ICC-ES AC106 Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.
- K. ICC-ES AC193 Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.
- L. ICC-ES AC308 Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.
- M. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
- N. NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2017.
- O. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- P. SMACNA (KVS) Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2001.
- Q. SMACNA (LEAK) HVAC Air Duct Leakage Test Manual; 2012.
- 1.4 PERFORMANCE REQUIREMENTS
 - A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.5 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.6 FIELD CONDITIONS

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

PART 2 PRODUCTS

- 2.1 DUCT ASSEMBLIES
 - A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- 2.2 MATERIALS
 - A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
 - B. Aluminum for Ducts: ASTM B209 (ASTM B209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
 - C. Stainless Steel for Ducts: ASTM A 240/A 240M, Type 304.
 - D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
 - 3. For Use With Flexible Ducts: UL labeled.
 - E. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
 - F. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - G. Insulated Flexible Ducts:
 - 1. Two ply vinyl film supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -10 degrees F to 160 degrees F.
 - H. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE Handbook Fundamentals.
- C. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide air foil turning vanes when rectangular elbows must be used.
- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
- H. Provide high efficiency 45 degree wye takeoffs for all branch ducts in medium and low pressure systems.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.
- 2.4 MANUFACTURED DUCTWORK AND FITTINGS
 - A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
 - B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
 - 3. Maximum Velocity: 4000 fpm.
 - 4. Temperature Range: Minus 10 degrees F to 160 degrees F.
 - C. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards -Metal and Flexible.
 - B. Install in accordance with manufacturer's instructions.
 - C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
 - D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
 - E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible.
 - F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
 - G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
 - H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
 - I. Use double nuts and lock washers on threaded rod supports.
 - J. Connect flexible ducts to metal ducts with draw bands and sealant plus sheet metal screws. Use a maximum of 5' of flexible duct, at final connection to diffusers only, free of kinks. Do not install above inaccessible ceilings. Do not use flexible ductwork in exposed areas.
 - K. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.2 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.3 SCHEDULES

- A. Ductwork Material:
 - 1. Medium Pressure Supply: Steel.
 - 2. Low Pressure Supply: Steel.
 - 3. Return and Relief: Steel.
 - 4. General Exhaust: Steel.
 - 5. Outside Air Intake: Steel.
 - 6. At contractor's option, phenolic ductwork may be used for supply and return ductwork in medium and low pressure systems.
 - 7. Dishwasher exhaust: aluminum or stainless steel
 - 8. Type II hood exhaust: stainless steel.
- B. Ductwork Pressure Class:
 - 1. Medium Pressure Supply: 3 inch.
 - 2. Return and Relief: 1 inch.
 - 3. General Exhaust: 1/2 inch.

SECTION 233110

NON-FIBROUS, CLOSED CELL, OUTDOOR DUCTWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Thermaduct, ducts and fittings by Thermaduct, LLC.
- B. This section does not include:
 - 1. Air passages rated under continuous internal static pressure of 6" w.g. positive, 6" negative, with test pressure rating: 10" w.g. startup and 10" w.g. negative documented on product labeling.

1.2 SUBMITTALS

- A. Product data: For each type of product indicated.
- B. Shop drawings: Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work including.
 - 1. Duct layout indicating sizes and pressure classes.
 - 2. Elevation of top of ducts.
 - 3. Dimensions of main duct runs from building grid lines.
 - 4. Fittings.
 - 5. Penetrations through exterior walls and other partitions.
- C. Coordination Drawings: Plans, drawn to scale, showing coordination general construction, building components, and other building services.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Thermaduct can be installed by competent trained field mechanics who demonstrate competence in the HVAC industry.
- 1.4 SPECIFICATION COMPLIANCE
 - A. SMACNA LEAKAGE, CLASS 1 OR LESS.
 - B. Thermaduct shall incorporate a Kingspan KoolDuct fortified inner liner and shall be compliant to UL (C-UL) 181 Standard for Safety Listed, Class 1 system, with included testing and passing the following:
 - 1. Test for Surface Burning Characteristics
 - 2. Flame Penetration Test
 - 3. Burning Test
 - 4. Mold Growth and Humidity Test
 - 5. Low Temperature Test and High Temperature Test
 - 6. Puncture Test
 - 7. Static Load Test
 - 8. Impact Test
 - 9. Pressure Test and Collapse (negative pressure) Test
 - 10. High Temperature and Humidity for 90 days
 - 11. Cone Calorimeter
 - 12. ASTM E2257 Standard Test Method for Room Fire Test of Wall and Ceiling Materials and Assemblies
 - 13. ASTM E 84 tested, Tunnel Test, Does not exceed 25 flame spread, 50 smoke developed.
 - 14. DW144, Class B
 - 15. NRTL product approval, (Subpart S of 29 CFR Part 1910, OSHA)
 - 16. ASTM C 423 noise reduction
 - 17. ASTM E 96/E 96M Procedure A for permeability
 - 18. ASTM C 1071 for erosion
 - 19. ASTM C 518: 2004, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

- 20. UL 723, Test for Surface Burning Characteristics of Building Materials
- 21. NFPA Compliance:
 - a. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
 - b. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"
 - c. NFPA 255, "Standard Method of Test of Surface Burning Characteristics of Building Materials
- C. Thermaduct outer shell shall be a UV stable, 39 mil high impact resistant titanium infused vinyl with included testing as following;
 - 1. UL-94 Flammability V-0
 - 2. ASTM D-638 Tensile Strength of 6250 psi
 - 3. ASTM D-790 Flexible Strength of 11,000 psi
 - 4. ASTM D-4226 Drop Impact Resistance
 - 5. ASTM D-4216 Cell Classification

1.5 PRODUCT DELIVERY AND STORAGE

- A. Prevent objectionable aesthetic damage to the outer surface of duct segments during transport and storage.
- B. Store duct segments under cover and protect from excessive moisture prior to installation.

PART 2 - PRODUCTS

- 2.1 THERMADUCT RETANGULAR DUCT AND FITTINGS
 - A. Product:
 - 1. Thermaduct.
 - B. The panel shall be manufactured of CFC-free Kooltherm closed cell rigid thermoset resin thermally bonded on both sides to a factory applied .001" (25 micron) aluminum foil facing reinforced with a fiberglass scrim. An added UV stable, 39 mil high impact resistant titanium infused vinyl is factory bonded to the outer surfaces to provide a zero permeability water tight barrier.
 - C. The thermal conductivity shall be no greater than 0.13BTU in/Hr •ft2•°F (.018W/m•°C), the thermal conductivity shall be no greater than 0.13BTU in/Hr •ft2•°F (.018W/m•°C)
 - D. The density of the Kooltherm foam shall not be less than 3.5 pcf (56 Kg/m3) with a minimum compressive strength of 28 psi (.2 MPa).
 - E. 1-3/4" thick (R12.0) panels shall be used.
 - 1. Maximum Temperature: Continuous rating of 185 degrees F (70 deg C) inside ducts or ambient temperature surrounding ducts.
 - 2. Maximum Thermal Conductivity: 0.13 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 - 3. Permeability: 0.00 perms maximum when tested according to ASTM E 96/E 96M, Procedure A.
 - 4. Antimicrobial Agent: Compound shall be tested for efficacy by an NRTL, and registered by the EPA for use in HVAC systems.
 - 5. Noise-Reduction Coefficient: 0.05 minimum when tested according to ASTM C 423, Mounting A.
 - 6. Required Markings: All interior duct liner shall bear UL label and other markings required by UL 181 on each full sheet of duct panel; UL ratings for internal closure materials.
 - 7. All insulation materials shall be closed cell with a closed cell content of >90%.
 - F. Closure Materials:
 - 1. V-Groove Adhesive: Silicone (interior).
 - 2. UV stable 39 mil high impact resistant titanium infused vinyl (exterior).
 - a. Factory manufactured seamless corners.
 - b. Cohesive bonded over-lap at corner seam covers.
 - c. Water resistant titanium infused welded vinyl seams.
 - d. Mold and mildew resistant.
 - 3. Polymeric Sealing System:
 - a. Structural Membrane: Aluminum scrim with woven glass fiber with UV stable vinyl clad applied

- b. Minimum Seam Cover Width: 2 7/8" inches (75 mm)
- c. Sealant: Low VOC.
- d. Color: White
- e. Water resistant.
- f. Mold and mildew resistant.
- 4. Duct Connectors.
 - a. Factory manufactured galvanized 4-bolt flange.
- G. Outdoor Cladding
 - 1. Thermaduct outdoor Installations: Duct segments shall incorporate UV stable 39 mil high impact resistant titanium infused vinyl which is introduced during the manufacturing process.
- H. Flange coverings
 - 1. Flanges are field sealed airtight before flange covers are installed. Flange covering consists of the following:
 - a. Foam tape insulation with molded 39 mil covers.
 - b. Air gap (heating only application) with molded 39 mil covers.
- I. Weight
 - 1. Thermaduct shall provide low weight stresses on the building framing and support members. The R-8.1 Thermaduct shall have a maximum weight of 3 lbs. per square foot. Hangers and tie-downs are to be detailed on the manufacturer's installing contractors detail drawings prior to installation but not exceeding 13' for duct girth <84" and 8' for duct girth >85" between hangers and designed to carry the weight and wind load of the ductwork.

PART 3 - EXECUTION

3.1 SHOP FABRICATION

- A. Certification:
 - 1. Ducts shall be detailed and fully factory manufactured by Thermaduct, LLC facility system guidelines. All fabrication labor will be certified "yellow label" building trade professionals, compliant to SMWIA and SMACNA labor guidelines (work preservation observed).
- B. Fabrication:
 - 1. Fabricated joints, seams, transitions, reinforcement, elbows, branch connections, access doors and panels, and damage repairs according to manufacturer's written and detailed instructions.
 - 2. Fabricated 90-degree mitered elbows to include turning vanes.
 - 3. Fabricated duct segments in accordance with manufacturer's written details.
 - 4. Duct Fittings shall include 6 inches of connecting material, as measured, from last bend line to the end of the duct. Connections on machine manufactured duct may be 4 inches.
 - 5. Fabricated duct segments utilizing v-groove method of fabrication. Factory welded or cohesively bonded seams will apply to fully manufactured ductwork and fittings. Internal seams will be supplied with an unbroken layer of low VOC silicone or bonding (for paint shop applications). Each duct segment will be factory supplied with duct connectors in accordance with manufacturer's detailed submittal guide. Applied duct reinforcement to protect against side deformation from both positive and negative pressure per manufacturer's design guide based on specified ductwork size and system pressure.
 - 6. Designed and fabricated duct segments and fittings will be in accordance with "SMACNA HVAC Duct Construction Standards" latest edition.
 - 7. Both positive and negative ductwork and fittings shall be constructed to incorporate a UL Listed as a Class 1 air duct to Standard for Safety UL 181 liner with an exterior clad for permanent protection against water intrusion.
- 3.2 DUCT INSTALLATION
 - A. Duct segments shall be installed be competent HVAC installers.
 - B. Install ducts and fittings to comply with manufacturer's installation instructions as follows:
 - 1. Install ducts with fewest possible joints.

- 2. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- 3. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- 4. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."
- 5. Use prescribed duct support spacing as described in this specification and manufacturer's recommendations.
- C. Air Leakage: Duct air leakage rates to be in compliance with "SMACNA HVAC Duct Construction Standards" latest version per applicable leakage class based on pressure.

3.3 HANGER AND SUPPORT INSTALLATION

- A. Contractor to ensure that the ductwork system is properly and adequately supported.
 - 1. Ensure that the chosen method is compatible with the specific ductwork system requirements per Thermaduct installation detail drawings. Pre-installation should be provided prior to work commencement by installing contractor for approval.
 - 2. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Supports on straight runs of ductwork shall be positioned at centers not exceeding 13 feet (3.96 m) for duct sections when fabricated in 13 foot (3.96 m) lengths with duct girth less than 84". Larger duct sizes and short segments with duct girth greater than 84" are to be supported at 8 foot centers or less, in accordance with the Thermaduct installation details provided prior to work commencement.
- C. Ductwork shall be supported at changes of direction, at branch duct connections, tee fittings, parallel under turning vanes and all duct accessories such as dampers, etc.
- D. The load of such accessories to the ductwork shall be neutralized by the accessory support.

3.4 FIELD QUALITY CONTROL

- A. Inspection: Arrange for manufacturer's representative to inspect completed installation and provide written report that installation complies with manufacturer's written instructions.
 - 1. Remove and replace duct system where inspection indicates that it does not comply with specified requirements.
- B. Perform additional testing and inspecting, at the Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.5 DUCT SCHEDULE

- A. Outdoor Ducts and Fittings:
 - 1. Thermaduct Rectangular Ducts and Fittings:
 - a. Minimum Panel Thickness: 1-3/4"
 - b. Aluminum Cladding: minimum 0.025 inch thick.
 - c. Vinyl Cladding: minimum 39 mil
SECTION 233300 AIR DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Air turning devices/extractors.
- B. Flexible duct connections.
- C. Constant airflow regulators
- D. Volume control dampers.
- 1.2 RELATED REQUIREMENTS
 - A. Section 233100 HVAC Ducts and Casings.
- 1.3 REFERENCE STANDARDS
 - A. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.
 - B. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).
- 1.4 DELIVERY, STORAGE, AND HANDLING
 - A. Protect dampers from damage to operating linkages and blades.
- PART 2 PRODUCTS
- 2.1 AIR TURNING DEVICES/EXTRACTORS
 - A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.
- 2.2 FLEXIBLE DUCT CONNECTIONS
 - A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, and as indicated.
 - B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - . Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gage thick galvanized steel.
 - C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

2.3 CONSTANT AIRFLOW REGULATORS

- A. Manufacturers:
 - 1. Aldes
- B. Constant Airflow Regulators shall be capable of maintaining constant airflow within +/- 10% of scheduled flow rates (15% for units 50 CFM or less), within the operating range of 0.2 to 0.8 in. w.g. differential pressure, or 0.6 to 2.4 in. w.g. on high-pressure models (CAR-II-HP), or 0.1 to 0.42 in. w.g. on low-pressure models (CAR-II-LP). Regulators shall be provided as an assembly consisting of a 94V-0 UL ABS plastic body housed within a round sleeve for mounting in round duct. Each round sleeve must be fitted with a lip gasket to ensure perimeter air tightness with the interior surface of the duct. All regulators must be classified per UL 2043 and carry the UL mark indicating compliance. All Constant Airflow Regulators will require no maintenance and must be warranted for a period of no less than five years. Constant Airflow Regulators shall be installed in tight ducting systems in accordance with all applicable codes and manufacturer's instructions.

2.4 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

- B. Splitter Dampers:
 - 1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
 - 2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
 - 3. Operator: Minimum 1/4 inch diameter rod in self aligning, universal joint action, flanged bushing with set screw .
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

F. Quadrants:

- 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
- 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
- G. Provide cable operated remote damper operators to operate dampers located in concealed inaccessible locations.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 233100 for duct construction and pressure class.
- B. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- C. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- D. Provide balancing dampers where indicated on drawings.
- E. Provide balancing dampers on rectangular low pressure duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Dampers may not be shown on drawings, but shall be provided regardless. Omit dampers only where noted on drawings.

SECTION 233700 AIR OUTLETS AND INLETS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Diffusers.
 - B. Registers/grilles.
- 1.2 REFERENCE STANDARDS
 - A. ASHRAE Std 70 Method of Testing the Performance of Air Outlets and Inlets; 2006 (Reaffirmed 2011).

1.3 SUBMITTALS

- A. See Division 1 Section Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- 1.4 QUALITY ASSURANCE
 - A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
 - A. Carnes Company HVAC: www.carnes.com.
 - B. Krueger: www.krueger-hvac.com/#sle.
 - C. Price Industries: www.price-hvac.com/#sle.
 - D. Titus: www.titus-hvac.com/#sle.
- 2.2 DIFFUSERS, REGISTERS, AND GRILLES
 - A. Type and performance are scheduled on the drawings.
 - B. Coordinate finish of all devices with Architect.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install in accordance with manufacturer's instructions.
 - B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
 - C. Install diffusers to ductwork with air tight connection.
 - D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
 - E. Paint ductwork visible behind air outlets and inlets matte black. Coordinate with G.C.
- 3.2 SCHEDULES
 - A. On Drawings.

SECTION 234000 HVAC AIR CLEANING DEVICES

PART 1 GENERAL

- 1.1 SECTION INCLUDES
 - A. Disposable, extended area panel filters.
 - B. Filter frames.
- 1.2 REFERENCE STANDARDS
 - A. ASHRAE Std 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2017.
 - B. UL 900 Standard for Air Filter Units; Current Edition, Including All Revisions.
- 1.3 EXTRA MATERIALS
 - A. Provide one set of disposable panel filters. Filters shall be delivered to Owner.

PART 2 PRODUCTS

2.1 FILTER MANUFACTURERS

- A. American Filtration Inc: www.americanfiltration.com/#sle.
- B. AAF International/American Air Filter: www.aafintl.com/#sle.
- C. Camfil Farr Company: www.camfilfarr.com/#sle.

2.2 DISPOSABLE, EXTENDED AREA PANEL FILTERS

- A. Media: UL 900 Class 1, pleated, lofted, non-woven, reinforced cotton fabric; supported and bonded to welded wire grid by corrugated aluminum separators.
 - 1. Frame: Non-flammable.
 - 2. Nominal thickness: 2 inches.
- B. Minimum Efficiency Reporting Value (MERV): 8, when tested in accordance with ASHRAE 52.2.
- 2.3 FILTER FRAMES AND HOUSINGS
 - A. General: Fabricate filter frames and supporting structures of 16 gage, 0.0598 inch galvanized steel or extruded aluminum T-section construction with necessary gasketing between frames and walls.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install air cleaning devices in accordance with manufacturer's instructions.
- B. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- C. Install filter gage static pressure tips upstream and downstream of high efficiency filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust and level.
- D. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with clean set.
- E. Ensure that filters are easily removable from equipment, and that access is not blocked by other installations.

SECTION 237223 PACKAGED AIR-TO-AIR ENERGY RECOVERY UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Energy recovery units.
- B. Casing.
- C. Roof curbs.
- D. Power and controls.
- E. Accessories.
- 1.2 REFERENCE STANDARDS
 - A. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.
 - B. UL 723 Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
- 1.3 SUBMITTALS
 - A. Product Data: Manufacturer's installation instruction, product data, and engineering calculations.
 - B. Shop Drawings: Show design and assembly of energy recovery unit and installation and connection details.
- 1.4 QUALITY ASSURANCE
 - A. Manufacturer Qualifications:
 - 1. Firm regularly engaged in manufacturing energy recovery units..
 - 2. Products in satisfactory use in similar service for not less than five years.
 - B. FACTORY VERIFICATION TESTING
 - 1. Unit shall be run tested prior to shipment from the factory.
 - 2. Factory run test report shall be provided at the request of the engineer, contractor, or owner.
 - 3. Testing Procedures
 - a. Unit shall be subjected to and pass a dielectric (hipot) test.
 - b. All motorized dampers shall be cycled one full stroke while installed in the unit using the factory-provided motorized actuators.
 - c. Supply fan
 - 1) Visually inspect ramp-up, ramp-down, and rotation direction of fan when enabled.
 - 2) Verify fan pressure proving switch operation.
 - 3) Measure and record current draw through supply fan motor(s).
 - d. Exhaust fan
 - 1) Visually inspect ramp-up, ramp-down, and rotation direction of fan when enabled.
 - 2) Verify fan pressure proving switch operation.
 - 3) Measure and record current draw through exhaust fan motor(s).
 - e. Energy recovery wheel.
 - 1) Visually inspect energy recovery wheel cassette is free to rotate within cassette.
 - 2) Visually inspect energy recovery belt drive mechanism.
 - 3) Enable energy recovery wheel motor and ensure proper rotation.
 - 4) Measure and record current draw through energy recovery wheel motor.
 - f. Indirect gas furnace
 - 1) Indirect gas furnace shall be run tested while installed inside unit with 8.5 in.wg of natural gas.
 - 2) Measure and record leaving air temperature and manifold pressure at minimum fire.
 - 3) Measure and record leaving air temperature and manifold pressure and maximum fire.
 - g. Condensing fans
 - 1) Ensure fans rotate freely without obstruction.

- 2) Energize fans and ensure proper rotation.
- 3) Measure and record the amount of current draw through each condensing fan.
- h. Refrigeration system
 - 1) Measure and record subcooling and superheat on circuit A with hot-gas reheat valve closed (0%) after 15 minutes of steady-state operation.
 - 2) Measure and record subcooling and superheat on circuit A with hot-gas reheat valve open (100%) after 15 minutes of steady-state operation.
 - 3) Measure and record subcooling and superheat on circuit B after 15 minutes of steady-state operation.
- 4. Test report shall be included with unit and available from the factory upon request.

1.5 WARRANTY

- A. Warranty ventilator to be free from defects in material and workmanship and of all parts for period of 12 months from date of Substantial Completion.
- B. Warranty energy recovery wheel to be free from defects in material and workmanship for 3 years under circumstances of normal use.
- C. Warranty compressors to be free from defects in material and workmanship for 5 years under circumstances of normal use.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Energy Recovery Ventilators:
 - 1. Valent
 - 2. Semco Inc.: www.semcohvac.com.

2.2 ENERGY RECOVERY UNITS

- A. Energy Recovery Units: Enthalpy wheel type. Include DX cooling with modulating HGRH, and natural gas heating.
- 2.3 CASING
 - A. Wall, Floor, and Roof Panels:
 - 1. Construction: 2 inch thick, double wall box construction, with formed edges of exterior wall overlapping formed edges of interior wall.
 - 2. Exterior Wall: Painted steel.
 - a. 22 gage, 0.0299 inch galvanized steel.
 - 3. Interior Wall: Galvanized sheet metal.
 - a. 22 gage, 0.0299 inch galvanized sheet metal.
 - 4. Insulation:
 - a. 2 inch insulated fiberglass.
 - b. Flame Spread Index (FSI): 25 or less, when tested in accordance with ASTM E84 or UL 723.
 - c. Smoke Developed Index (SDI): 50, maximum, when tested in accordance with ASTM E84 or UL 723.
 - 5. Roof Panel: Weatherproof.
 - 6. Panel Joints: T-shaped standing seams with overlapping metal caps.
 - B. Access doors
 - 1. Access doors shall be provided for access to all components requiring regular maintenance or inspection.
 - 2. Access doors shall have a minimum of two quarter-turn compression latches with adjustable catches.
 - 3. Access door construction shall be identical to unit casing.
 - 4. Interior side of access doors shall be 22 gage G-90 galvanized steel.
 - 5. Exterior side of panel shall be 22 gage painted steel rated for 1000 hours in accordance with ASTM B117 and ASTM D1654.

6. Access doors shall be sealed with a full-perimeter gasket constructed of Mylar-encased low-density foam.

2.4 BLOWERS/MOTORS

- A. Blowers
 - 1. Fan assemblies shall be direct-drive without the use of belts or adjustable sheaves.
 - 2. Manufacturer shall provide a variable frequency drive for each fan section.
 - 3. Variable frequency drive shall be mounted, wired, and programmed by the manufacturer.
 - 4. Variable frequency drive shall be located in an enclosed compartment outside of the supply or exhaust air stream.
 - 5. Fan wheel shall be tested in accordance to AMCA 210.

B. Motors

1. Fan motor shall be VFD rated, ODP type, EPACT compliant.

2.5 DAMPERS

- A. Motorized dampers
 - 1. Frame shall be constructed of a 16 gage galvanized steel hat-channel.
 - 2. Blades shall be constructed of 16 gage galvanized steel strengthened by three longitudinal 1 inch deep "vee" grooves.
 - 3. Blades shall be symmetrical relative to its axle pivot point.
 - 4. Axle bearings shall be synthetic sleeve-type and rotate inside extruded holes in the damper frame.
 - 5. Blade seals shall be extruded vinyl permanently bonded to the appropriate blade edges.
 - 6. Frame shall include flexible stainless steel compression-type jamb seals.
 - 7. Modulating spring-return actuators shall be provided by the factory, installed on the damper, and wired to the control center.
 - 8. Damper leakage shall be no more than 3 cfm/sq.ft. at 1 in.wg static pressure.

2.6 FILTERS

- A. Outdoor air intake hood
 - 1. Filter rack shall accommodate 1" media.
 - 2. Manufacturer shall provide 1 set of 1" aluminum filter media.
 - 3. Filter sections shall be accessible outside the unit and located in the outdoor air intake hood.
- B. Outdoor air filters
 - 1. Outdoor air filter rack shall accommodate factory-provided [2" MERV 8, 2" aluminum] filters.
 - 2. Filter sections shall be accessible through a 2" foam-injected, double-wall, hinged access door with quarter-turn latches.
- C. Supply air filters
 - 1. Supply air filter rack shall accommodate [2" MERV 8, 4" MERV 11, 4" MERV 14] filters.
 - 2. Filter sections shall be accessible through a 2" thick, foam-injected, double-wall, hinged access door with quarter-turn latches.
- D. Return air filters
 - 1. Return air filter rack shall accommodate factory-provided [2" MERV 8, 2" aluminum] filters.
 - 2. Filter sections shall be accessible through a 2" thick, foam-injected, double-wall, hinged access door with quarter-turn latches.

2.7 ENERGY RECOVERY- TOTAL ENTHALPY WHEEL

- A. Energy recovery section shall be an integral part of unit from the manufacturer.
- B. No field assembly, ducting, or wiring shall be required with energy recovery option.
- C. Energy recovery media shall be accessible through a 2" thick, foam-injected, double-wall, hinged access door with quarter-turn latches.
- D. Energy wheel: Unit energy wheel shall handle the full volume of outdoor and exhaust air without an energy wheel bypass damper. Energy wheel shall be of total enthalpy, rotary air-to-air type and shall be an element of a removable energy wheel cassette. The cassette shall consist of a galvanized steel

framework (designed to produce laminar air flow through the wheel), an energy wheel as specified and a motor and drive assembly. The cassette shall incorporate a pre-tensioned urethane drive belt or a link style belt with a five year warranty. The wheel media shall be a polymer film matrix. Wheel shall be comprised of individual segments that are removable for servicing Silica gel desiccant shall be permanently bonded to the polymer film. The energy wheel is to have a five year warranty. Performance criteria are to be as specified in AHRI Standard 1060, complying with the Combined Efficiency data in the submittal.

1. Electric preheater shall be provided for frost control.

2.8 COOLING - AIR COOLED DX

- A. Unit shall be provided with factory piped, charged, and tested packaged air-cooled direct expansion refrigeration system.
- B. Refrigeration systems 13 nominal tons and above shall be equipped with two stages of capacity control, each on an independent refrigerant circuit.
- C. Refrigeration systems 30 nominal tons and above shall be equipped with four stages of capacity control, two stages per independent circuit.
- D. Refrigeration system shall include microprocessor-based head pressure control logic to maintain refrigerant pressures by actively modulating condenser airflow (Active Head Pressure Control).
- E. Thermal expansion valves
 - 1. Refrigeration system shall be provided with thermal expansion valve (TXV) incorporating adjustable superheat.
- F. Evaporator coil
 - 1. Coil shall be rated in accordance to ARI standards and pressure tested for 250 psi working pressure.
 - 2. Coil shall be a minimum of 4 rows deep.
 - 3. Refrigeration systems with more than one circuit shall have interlaced evaporator coils.
 - 4. Coil casing shall be constructed of 16 gage galvanized steel casing.
 - 5. Coil tubes shall be constructed of 1/2" diameter, 0.016" thick seamless copper tubing.
 - 6. Coil fins shall be constructed of 0.0060" thick aluminum.
- G. Drain pan
 - 1. Drain pan shall be constructed of a minimum of 18 gage 201 stainless steel.
 - 2. Drain pan shall be double-sloped to ensure condensate removal from unit.
 - 3. Drain pan shall extend a minimum of 8" past the evaporator coil to ensure condensate retention.
- H. Modulating hot-gas reheat
 - 1. Hot-gas reheat coil shall be separated from the evaporator coil by a minimum of 6" in the direction of airflow to prevent the re-evaporation of condensate, provide room for coil cleaning, and allow control system to monitor evaporator coil leaving air temperature.
 - 2. Coil shall be rated in accordance to ARI standards and pressure tested for 250 psi working pressure.
 - 3. Coil casing shall be constructed of 16 gage galvanized steel casing.
 - 4. Coil tubes shall be constructed of 3/8" diameter, 0.016" thick seamless copper tubing.
 - 5. Coil fins shall be constructed of 0.0060" thick aluminum fins.
 - 6. Hot-gas reheat shall be controlled through a factory-supplied modulating control valve.
- I. Compressors
 - 1. Compressors shall be hermetic scroll type and include the following items:
 - a. Suction and discharge service valves.
 - b. Reverse rotation protection.
 - c. Oil level adjustment.
 - d. Oil filter.
 - e. Rotary dirt trap.
 - f. Short cycling control.
 - g. High and low pressure limits.
 - h. Crankcase heaters.

- 2. Compressors shall be installed in an isolated compartment separate from supply airflow, return airflow, microprocessor controller, non-fused disconnect, compressor relays, fan motor VFD, and all other electrical components inside the unit.
- 3. Compressors shall be installed using manufacturer's recommended rubber vibration isolators.
- 4. Lead refrigeration circuit shall be inverter driven.
- J. Condenser coils
 - 1. Provide condenser coils with galvanized casing, seamless copper tubes, and aluminum fins.
 - 2. Coil casing shall be constructed of 16 gage galvanized steel.
 - 3. Coil tubes shall be constructed of 3/8" diameter, 0.016" thick seamless copper tubing.
 - 4. Coil fins shall be constructed of 0.0060" thick aluminum fins.
- K. Condensing fans
 - 1. Condensing section shall be equipped with 1140 rpm direct-drive condensing fans.
 - 2. Condensing fan assembly shall be statically and dynamically balanced in accordance with AMCA Standard 204-05.
 - 3. Condensing fan assembly shall consist of aluminum-bladed propeller fan wheel, formed-channel base, formed inlet venturi, and coated steel basket guard on the discharge.
- L. Options
 - 1. Hot gas bypass shall be provided on lead refrigeration circuit.
 - 2. Condensing section shall include factory provided and installed condenser coil guards.

2.9 HEATING - INDIRECT GAS FIRED

A. Unit shall be provided with stainless steel heat exchanger and modulating gas burner.

2.10 ELECTRICAL

- A. Units shall be factory wired with a single point power connection.
- B. Units shall be wired according to NEC and listed per ETL.
- C. ETL listing shall cover all components of the ventilator and not be limited to the control panel.
- D. All major electrical components shall be UL listed.
- E. Unit shall be constructed with an integral control center isolated from supply airflow, exhaust airflow, compressors, and heating elements.
- F. The following items shall be provided and wired within the control center by the factory:
 - 1. Non-fused disconnect.
 - 2. Sub-circuit fusing.
 - 3. Low voltage transformers.
 - 4. Control circuit fusing.
 - 5. Terminal block.
 - 6. Fan motor variable frequency drives.
- G. Electrical panel must house all high voltage components such as terminal blocks, variable frequency drives, and fuse blocks.
- H. Options
 - 1. Control panel shall include a factory mounted and wired 115V GFCI convenience outlet receptacle with a 12A circuit breaker.

2.11 CONTROLS

- A. Units shall include factory supplied, mounted, wired, and tested stand-alone microprocessor controls.
- B. Microprocessor controller shall be factory-programmed for discharge air control and use an internal 7-day time clock.
- C. Microprocessor controller shall be mounted in a weather-proof enclosure and accessible without exposing the operator to high voltage wiring or having to turn off or circumvent the main disconnect.
- D. Microprocessor controller shall include local liquid crystal display (LCD) for user interface.

- E. The following sensors shall be factory supplied, mounted, and wired inside the unit:
 - 1. Outdoor air humidity sensor.
 - 2. Outdoor air temperature sensor.
 - 3. Evaporator coil leaving air temperature sensor.
 - 4. Supply air filter pressure monitoring.
 - 5. Energy wheel rotation sensor.
- F. The following devices shall be factory supplied but ship loose and require field installation and wiring:
 - 1. Wall-mounted room air temperature sensor with manual adjuster.
 - 2. Wall-mounted room air humidity sensor.
 - 3. Supply air temp temperature sensor.
 - 4. Wall-mounted CO2 sensor.
 - 5. Space static pressure sensor.
 - 6. Duct static pressure sensor.
- G. Microprocessor controller shall include BACnet IP communications for building management system interface.

2.12 ROOF CURBS

A. Isolation Rails: Provide factory-installed, 12 gage, 0.1046 aluminized steel angles top and bottom, connected with flexible, outdoor rated membrane and factory-installed vibration isolation springs.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that structure is ready for installation of unit, that openings in deck for ductwork, if required, are correctly sized and located, and that mechanical and electrical utilities supplying unit are of correct capacities and are accessible.

3.2 INSTALLATION

- A. Provide openings for suitable ductwork connection.
- 3.3 SYSTEM STARTUP
 - A. Provide services of manufacturer's authorized representative to provide start up of unit.
- 3.4 CLEANING
 - A. Clean filters, air plenums, interior and exposed-to-view surfaces prior to Substantial Completion.

SECTION 237413

PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Packaged roof top unit.
- B. Unit controls.
- C. Roof mounting curb and base.

1.2 RELATED REQUIREMENTS

- A. Section 230548 Vibration Controls for HVAC Piping and Equipment.
- B. Section 234000 HVAC Air Cleaning Devices.
- C. Section 262717 Equipment Wiring: Installation and wiring of thermostats and other controls components; wiring from unit terminal strip to remote panel.

1.3 REFERENCE STANDARDS

- A. AHRI 210/240 Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 270 Sound Performance Rating of Outdoor Unitary Equipment; 2015.
- C. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.

1.4 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- 1.5 WARRANTY
 - A. See Section 017800 Closeout Submittals, for additional warranty requirements.
 - B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Trane
- B. Carrier
- 2.2 PERFORMANCE REQUIREMENTS
 - A. Performance shall be as scheduled on drawings.
- 2.3 MANUFACTURED UNITS
 - A. General: Roof mounted units having electric heating elements and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, electric heating elements, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.4 FABRICATION

- A. Cabinet: Steel with baked enamel finish, including access doors with piano hinges and locking handle.
- B. Supply Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 230548.
- C. Air Filters:
 - 1. 2 inch thick glass fiber disposable media in metal frames.
- D. Roof Mounting Curb: 14 inches high galvanized steel, channel frame with gaskets, nailer strips.

2.5 BURNER

- A. Gas Burner: Induced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.

2.6 EVAPORATOR COIL

- A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.
- B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

2.7 COMPRESSOR

A. Provide scroll compressors, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

2.8 CONDENSER COIL

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.9 OPERATING CONTROLS

- A. Provide low voltage, adjustable room thermostat to control burner operation, compressor and condenser fan, and supply fan to maintain temperature setting.
 - 1. Include system selector switch (off-heat-auto-cool) and fan control switch (auto-on).
 - 2. Locate thermostat in room as shown.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3.3 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

SECTION 238130

VARIABLE REFRIGERANT FLOW SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The variable capacity, heat pump heat recovery air conditioning system is a TRANE CITY MULTI VRFZ (Variable Refrigerant Flow Zoning) System. The CITY MULTI VRFZ systems shall be the R2-Series (simultaneous cooling and heating) split system heat pump
- B. Section includes:
 - 1. Outdoor heat pump units
 - 2. Branch controllers
 - 3. Indoor units
 - 4. Energy recovery ventilators
 - 5. System controls
- C. Related Requirements:
 - 1. Section 230719 "HVAC Piping Insulation"
 - 2. Section 232300 "Refrigerant Piping"
 - 3. Section 233100 "HVAC Ducts and Casings"

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Conference to include installing contractor and equipment supplier. Supplier shall advise installing contractor on installation, refrigerant piping, and control wiring best practices.
 - 1. Contractor shall submit preinstallation conference notes for review.
 - 2. Should items discussed at preinstallation conference be in conflict with other information contained elsewhere in the construction documents, the most stringent requirement shall apply, unless approved in writing by the Engineer.
- 1.4 ACTION SUBMITTALS
 - A. Product Data: For each type of product.
 - B. Shop Drawings:
 - 1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit documentation that installer has completed the Mitsubishi Electric three day service course.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data
- B. Field quality-control reports.
- 1.7 QUALITY ASSURANCE
 - A. Installer Qualifications: Installer(s) shall have successfully completed the three day service course offered by Mitsubishi Electric.
- 1.8 DELIVERY, STORAGE, AND HANDLING
 - A. Equipment shall be stored and handled according to the manufacturer's recommendation.

1.9 WARRANTY

- A. Special Warranty:
 - 1. All systems shall be:
 - a. Designed by a certified CITY MULTI Diamond Designer.
 - b. Installed by a contractor that has successfully completed the TRANE-Mitsubishi Electric three day service course.
 - c. Verified with a completed commissioning report submitted to and approved by the TRANE-Mitsubishi Electric Service Department.
 - 2. With this documentation, the units shall be covered by an extended manufacturer's limited warranty for a period of ten (10) years from date of installation.
 - 3. If, during the warranty period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty shall not include labor.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Manufacturers: Subject to compliance with requirements, provide products manufactured by TRANE/Mitsubishi, as represented by Mid America Trane.
 - 1. Contact Tim Berends with Mid America Trane at 316-655-6080 for information.

2.2 SYSTEM DESCRIPTION

- A. The R2-Series system shall consist of a TURY outdoor unit, BC (Branch Circuit) Controller, multiple indoor units (E models), and M-NET DDC (Direct Digital Controls). Each indoor unit or group of indoor units shall be capable of operating in any mode independently of other indoor units or groups. System shall be capable of changing mode (cooling to heating, heating to cooling) with no interruption to system operation. Each indoor unit or group of indoor units shall be independently controlled. The sum of connected capacity of all indoor air handlers shall range from 80% to 110% of outdoor rated heating capacity.
- 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 MATERIALS

- A. Refrigerant and Oil:
 - 1. Furnish an adequate supply of refrigerant and oil, and maintain refrigerant and oil in the system in proper quantities for one year warranty period from the date of acceptance by the Owner. Any source of leakage necessitating addition of refrigerant or oil during warranty period shall be found and corrected.
 - 2. Refrigerant or oil lost or contaminated during the warranty period shall be provided without additional charge for both labor and material.

2.4 VARIABLE REFRIGERANT FLOW SYSTEM COMPONENTS

- A. R2-Series Outdoor Units
 - 1. The R2-Series TURY outdoor unit shall be used specifically with CITY MULTI VRF components. The TURY outdoor units shall be equipped with multiple circuit boards that interface to the M-NET controls system and shall perform all functions necessary for operation. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.
 - a. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s).
 - b. Outdoor unit shall have a sound rating no higher than 60 dB(A) individually or 64 dB(A) twinned. Units shall have a sound rating no higher than 50 dB(A) individually or 53 dB(A) twinned while in night mode operation.
 - c. Both refrigerant lines from the outdoor unit to the BC (Branch Circuit) Controller (Single or Main) shall be insulated in accordance with the installation manual.
 - d. There shall be no more than 3 branch circuit controllers connected to any one outdoor unit.

- e. Outdoor unit shall be able to connect to up to 50 indoor units depending upon model.
- f. The outdoor unit shall have an accumulator with refrigerant level sensors and controls.
- g. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.
- h. The outdoor unit shall have the ability to operate with a maximum height difference of 164 feet and have total refrigerant tubing length of 1804-2625 feet. The greatest length is not to exceed 541 feet between outdoor unit and the indoor units without the need for line size changes or traps.
- i. The outdoor unit shall be capable of operating in heating mode down to -4°F ambient temperatures or cooling mode down to 23°F ambient temperatures, without additional low ambient controls.
- j. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained.
- k. The outdoor unit shall be provided with a manufacturer supplied 20 gauge hot dipped galvanized snow /hail guard. The snow/hail guard protects the outdoor coil surfaces from hail damage and snow build-up in severe climates.
- 1. Unit must defrost all circuits simultaneously in order to resume full heating more quickly. Partial defrost which may extend "no or reduced heating" periods shall not be allowed.
- 2. Unit Cabinet:
 - a. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.
- 3. Fan:
 - a. Each outdoor unit module shall be furnished with one direct drive, variable speed propeller type fan. The fan shall be factory set for operation under 0 in. WG external static pressure, but capable of normal operation under a maximum of 0.24 in. WG external static pressure via dipswitch.
 - b. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
 - c. All fan motors shall be mounted for quiet operation.
 - d. All fans shall be provided with a raised guard to prevent contact with moving parts.
 - e. The outdoor unit shall have vertical discharge airflow.
- 4. Coil:
 - a. The outdoor coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
 - b. The coil fins shall have a factory applied corrosion resistant blue-fin finish.
 - c. The coil shall be protected with an integral metal guard.
 - d. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.
 - e. The outdoor coil shall include 4 circuits with two position valves for each circuit, except for the last stage.
- 5. Compressor:
 - a. Each outdoor unit module shall be equipped with one inverter driven scroll hermetic compressor. Non inverter-driven compressors, which cause inrush current (demand charges) and require larger wire sizing, shall not be allowed.
 - b. A crankcase heater(s) shall be factory mounted on the compressor(s).
 - c. The outdoor unit compressor shall have an inverter to modulate capacity. The capacity shall be completely variable with a turndown of 19%-5% of rated capacity, depending upon unit size.
 - d. The compressor will be equipped with an internal thermal overload.
 - e. The compressor shall be mounted to avoid the transmission of vibration.
 - f. Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.
- 6. Controls:

- a. The outdoor unit shall have the capability of up to 8 levels of demand control for each refrigerant system
- 7. Electrical:
 - a. The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz.
 - b. The outdoor unit shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz), 207-253V (230V/60Hz).
 - c. The outdoor unit shall be controlled by integral microprocessors.
 - d. The control circuit between the indoor units, BC Controller and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.
- B. Branch Controllers
 - 1. The BC (Branch Circuit) Controllers shall include multiple branches to allow simultaneous heating and cooling by allowing either hot gas refrigerant to flow to indoor unit(s) for heating or subcooled liquid refrigerant to flow to indoor unit(s) for cooling. Refrigerant used for cooling must always be subcooled for optimal indoor unit LEV performance; alternate branch devices with no subcooling risk bubbles in liquid supplied to LEV and are not allowed.
 - 2. The BC (Branch Circuit) Controllers shall be specifically used with R410A R2-Series systems. These units shall be equipped with a circuit board that interfaces to the M-NET controls system and shall perform all functions necessary for operation. The unit shall have a galvanized steel finish. The BC Controller shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory. This unit shall be mounted indoors, with access and service clearance provided for each controller. The sum of connected capacity of all indoor air handlers shall range from 50% to 150% of rated capacity.
 - 3. BC Unit Cabinet:
 - a. The casing shall be fabricated of galvanized steel.
 - b. Each cabinet shall house a liquid-gas separator and multiple refrigeration control valves.
 - c. The unit shall house two tube-in-tube heat exchangers.
 - 4. Refrigerant valves:
 - a. The unit shall be furnished with multiple branch circuits which can individually accommodate up to 54,000 BTUH and up to three indoor units. Branches may be twinned to allow more than 54,000 BTUH.
 - b. Each branch shall have multiple two-position valves to control refrigerant flow.
 - c. Service shut-off valves shall be field-provided/installed for each branch to allow service to any indoor unit without field interruption to overall system operation.
 - d. Linear electronic expansion valves shall be used to control the variable refrigerant flow.
 - 5. Future Use
 - a. Each VRF system shall include at least one (1) unused branches or branch devices for future use. Branches shall be fully installed & wired in central location with capped service shutoff valve & service port.
 - 6. Electrical:
 - a. The unit electrical power shall be 208/230 volts, 1 phase, 60 Hertz.
 - b. The unit shall be capable of satisfactory operation within voltage limits of 187-228 (208V/60Hz) or 207-253 (230/60Hz).
 - c. The BC Controller shall be controlled by integral microprocessors
 - d. The control circuit between the indoor units and outdoor units shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.
- C. Indoor Units
 - 1. 4-Way Ceiling Cassette with grille:
 - a. The TLFY-P**NBMU-ER2 shall be a four-way cassette style indoor unit that recesses into the ceiling with a ceiling grille. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation

function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

- b. Unit Cabinet:
 - 1) The cabinet shall be space-saving ceiling-recessed cassette.
 - 2) The cabinet panel shall have provisions for a field installed filtered outside air intake.
 - 3) Branch ducting shall be allowed from cabinet.
 - 4) Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.
 - 5) The grille vane angles shall be individually adjustable from the wired remote controller to customize the airflow pattern for the conditioned space
- c. Fan:
 - 1) The indoor fan shall be an assembly with a turbo fan direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of five (5) speed settings, Low, Mid1, Mid2, High and Auto.
 - 4) The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.
 - 5) The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.
 - 6) The indoor unit shall have switches that can be set to provide optimum airflow based on ceiling height and number of outlets used.
 - 7) The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.
 - 8) The vanes shall have an Auto-Wave selectable option in the heating mode that shall randomly cycle the vanes up and down to evenly heat the space. Filter:
- d. Return air shall be filtered by means of a long-life washable filter
- e. Coil:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 33 inches above the condensate pan.
 - 7) Both refrigerant lines to the TLFY indoor units shall be insulated in accordance with the installation manual.
- f. Electrical:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
- g. Controls:
 - 1) This unit shall use controls provided by TRANE to perform functions necessary to operate the system.
 - 2) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
 - Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F - 9.0°F adjustable deadband from set point.
 - 4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

- 5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
- 2. 1-Way Ceiling Recessed Cassette with grille
 - a. The TMFY shall be a one-way cassette indoor unit that recesses into the ceiling with a ceiling grille and shall have a modulating linear expansion device. The TMFY shall be used with the R2-Series outdoor unit and BC Controller. The PMFY shall support individual control using M-NET DDC controllers. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
 - b. Unit Cabinet:
 - 1) The cabinet shall be space-saving ceiling recessed.
 - 2) The cabinet panel shall have provisions for a field installed filtered outside air intake.
 - 3) Branch ducting shall be allowed from cabinet.
 - 4) The one-way grille shall be fixed to bottom of cabinet allowing for one-way airflow.
 - c. Fan:
 - 1) The indoor fan shall be an assembly with one line-flow fan direct driven by a single motor.
 - 2) The indoor fan shall be statically and dynamically balanced to run on a motor with permanently lubricated bearings.
 - 3) The indoor fan shall consist of four (4) speeds, Low, Mid1, Mid2, and High.
 - d. Filter:
 - 1) Return air shall be filtered by means of a long-life washable permanent filter.
 - e. Coil:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) The unit shall be provided with an integral condensate lift mechanism able to raise drain water 23 inches above the condensate pan.
 - 7) Both refrigerant lines to the TMFY indoor units shall be insulated in accordance with the installation manual.
 - f. Electrical:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
 - g. Controls:
 - 1) This unit shall use controls provided by TRANE to perform functions necessary to operate the system. Please refer to Part 5 of this guide specification for details on controllers and other control options.
 - 2) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
 - 3) Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F 9.0°F adjustable deadband from set point.
 - 4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
 - 5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

- 3. Ceiling-Concealed Ducted Unit
 - a. The TEFY shall be a ceiling-concealed ducted indoor fan coil design that mounts above the ceiling with a 2-position, field adjustable return and a fixed horizontal discharge supply and shall have a modulating linear expansion device. The TEFY shall be used with the R2-Series outdoor unit and BC controller. The TEFY shall support individual control using M-NET DDC controllers. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.
 - b. Unit Cabinet:
 - 1) The unit shall be, ceiling-concealed, ducted.
 - 2) The cabinet panel shall have provisions for a field installed filtered outside air intake.
 - c. Fan:
 - 1) TEFY-NMAU models shall feature external static pressure settings from 0.14 to 0.60 in. WG.
 - 2) The indoor unit fan shall be an assembly with one or two Sirocco fan(s) direct driven by a single motor.
 - 3) The indoor fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
 - 4) The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function
 - 5) The indoor unit shall have a ducted air outlet system and ducted return air system.
 - d. Filter:
 - 1) Return air shall be filtered by means of a standard factory installed return air filter.
 - 2) Optional return filter box (rear or bottom placement) with high-efficiency filter shall be available for all TEFY indoor units.
 - e. Coil:
 - 1) The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing.
 - 2) The tubing shall have inner grooves for high efficiency heat exchange.
 - 3) All tube joints shall be brazed with phos-copper or silver alloy.
 - 4) The coils shall be pressure tested at the factory.
 - 5) A condensate pan and drain shall be provided under the coil.
 - 6) The condensate shall be gravity drained from the fan coil.
 - 7) Both refrigerant lines to the TEFY indoor units shall be insulated in accordance with the installation manual.
 - f. Electrical:
 - 1) The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
 - 2) The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).
 - g. Controls:
 - 1) This unit shall use controls provided by TRANE to perform functions necessary to operate the system. Please refer to Part 5 of this guide specification for details on controllers and other control options.
 - 2) Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
 - Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F - 9.0°F adjustable deadband from set point.
 - 4) Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

- 5) Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
- 4. Energy Recovery Ventilators
 - a. The fresh air ventilation system(s) shall utilize the TRANE LOSSNAY total heat exchanger with outside air bypass damper and energy recovery ventilation.
 - b. The Lossnay® ERV equipment shall form part of the TRANE CITY MULTI HVAC system and will supply ventilation air to all indicated indoor zones served by the CITY MULTI HVAC system.
 - c. The Lossnay® ERV shall be equipped with an M-Net data network control and will be directly connectable to the CITY MULTI M-Net Data communication control network and will be able to be electronically interlocked with CITY MULTI indoor units.
 - d. The ERV unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, control circuit board and blowers with motors, filters, and insulated foam air guides. Each unit will have an automatic by-pass damper system for economic operation under certain conditions. The unit shall have factory installed control board with functions for local, remote, and optional control modes.
 - e. Unit Cabinet:
 - 1) The cabinet shall be fabricated of galvanized steel, and covered with polyurethane foam insulation as necessary with steel mounting points securely attached
 - f. Blowers:
 - The unit shall be furnished with two (2) direct drive centrifugal blowers running simultaneously supplying and extracting air at the same rate for balanced ventilation air flow.
 - 2) The blower motors shall be a directly connected to the blower wheels and have permanently lubricated bearings.
 - 3) The blowers and motors shall be mounted for quiet operation.
 - g. Heat Exchanger
 - The Lossnay[®] heat exchanger element shall be constructed of specially treated cellulous fiber membrane separated by corrugated layers to allow total heat (sensible and latent) energy recovery from the exhaust air to the supply air or from the supply air to the exhaust air as determined by design conditions.
 - 2) The Lossnay® element shall have protective filters installed at both the supply and exhaust sides with an access cover to allow easy maintenance.
 - h. Bypass Damper
 - 1) The ERV shall have an automatic supply side by-pass damper to allow inbound ventilation air to by-pass the Lossnay® energy transfer core when outside weather conditions warrant.
 - 2) The mechanism for opening and closing the bypass damper shall be a 208V-230V synchronous electric motor through an actuator. The motor will drive a steel cable connected to an mechanical damper flap to allow fresh air to bypass the Lossnay® element.
 - 3) Supply and return air thermistor shall control the damper and may be interlocked with a Mitsubishi Electric PZ Series LCD remote controller.
 - i. Filter
 - The ERV shall be equipped with factory installed air filters located at each intake face (both supply and exhaust sides) of the Lossnay[®] core to clean the air and prevent clogging.
 - j. Mounting
 - Mounting of the Lossnay® ERV shall be as indicated in the plans and drawings. The ERV shall not require and condensate pan or receptacle nor condensate drain or piping. Mounting may be horizontal or vertical and the unit may be inverted as required by ductwork connection.
 - k. Electrical
 - 1) The units will require a 208-230Volt, 1 Phase, 60Hz power supply.

- l. Control
 - A 30vdc fuzzy logic signal generated by a CITY MULTI System via a 2 conductor non polar shielded, jacketed control wire to a PZ-60DR-E Mitsubishi LCD remote controller or interlocked with a CITY MULTI indoor unit.

D. Controls

- 1. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using BACnet® interfaces.
- 2. The CMCN shall operate at 30VDC. Controller power and communications shall be via a common non-polar communications bus.
- 3. Wiring:
 - a. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.
 - b. Control wiring for the Simple MA controllers shall be from the remote controller (receiver) to the first associated indoor unit (TB-15) then to the remaining associated indoor units (TB-15) in a daisy chain configuration.
 - c. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.
 - d. The TE-200, TE-50, and TW-50A centralized controller shall be capable of being networked with other TE-200, TE-50, and TW-50A centralized controllers for centralized control.
- 4. Wiring type:
 - a. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.
 - b. Network wiring shall be CAT-5 with RJ-45 connection.
- 5. Remote Controllers Backlit Simple MA Remote Controller (TAC-YT53CRAU)
 - a. The Backlit Simple MA Remote Controller (TAC-YT53CRAU) shall be capable of controlling up to 16 indoor units (defined as 1 group). The Backlit Simple MA Remote Controller shall be compact in size, approximately 3" x 5" and have limited user functionality. The Backlit Simple MA supports temperature display selection of Fahrenheit or Celsius. The Backlit Simple MA Remote Controller shall allow the user to change on/off, mode (cool, heat, auto (R2/WR2-Series only), dry, setback (R2/WR2-Series only) and fan), temperature setting, and fan speed setting and airflow direction. The Backlit Simple MA Remote Controller shall be able to limit the set temperature range from the Backlit Simple MA. The Backlit Simple MA Remote controller shall be capable of night setback control with upper and lower set temperature settings. The room temperature shall be sensed at either the Backlit Simple MA Remote Controller. The Backlit Simple MA Remote Controller shall be sensed at either the Backlit Simple MA Remote Controller. The Backlit Simple MA Remote Controller shall be sensed at either the Backlit Simple MA Remote Controller. The Backlit Simple MA Remote Controller shall be sensed at either the Backlit Simple MA Remote Controller. The Backlit Simple MA Remote Controller shall display a four-digit error code in the event of system abnormality/error.
 - b. The Backlit Simple MA Remote Controller shall require no addressing. The Backlit Simple MA Remote Controller shall connect using two-wire, stranded, non-polar control wire to TB15 connection terminal on the indoor unit. The Simple MA Remote Controller shall require cross-over wiring for grouping across indoor units.
- 6. Centralized Controller (Web-enabled)
 - a. TE-200 Centralized Controller: The TE-200A Centralized Controller shall be capable of controlling a maximum of two hundred (200) indoor units across multiple CITY MULTI outdoor units with the use of three (3) TE-50A expansion controllers. The AE-200A Centralized Controller shall be approximately 11-5/32" x 7-55/64" x 2-17/32" in size and shall be powered with an integrated 100-240 VAC power supply. The AE-200A Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction

monitoring. When being used alone without the expansion controllers, the TE-200A Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a collection of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the TE-200 Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, setback (R2/WR2-Series only) and fan), temperature setting, fan speed setting, and airflow direction setting. Since the TE-200A provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the TE-200A Centralized Controller shall allow the user to define both daily and weekly schedules (up to 24 scheduled events per day) with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

- b. All TE-200A Centralized Controllers shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to up to three TE-50A expansion controllers for display of up to two hundred (200) indoor units on the main TE-200A interface.
- c. The TE-200A Centralized Controller shall be capable of performing initial settings via the high-resolution, backlit, color touch panel on the controller or via a PC browser using the initial settings.
- d. Standard software functions shall be available so that the building manager can securely log into each TE-200A via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics.
- 7. The TRANE BACnet® interfacing license shall be compliant with BACnet® Protocol (ANSI/ASHRAE 135-2004) and be Certified by the (BTL) BACnet® Testing Laboratories. The BACnet® interface shall support BACnet Broadcast Management (BBMD). Operation and monitoring points include, but are not limited to, on/off, operation mode, fan speed, prohibit remote controller, filter sign reset, alarm state, error code, and error address.

PART 3 - EXECUTION

- 3.1 MANUFACTURER'S DIRECTIONS:
 - A. Install equipment in strict accordance with manufacturer's recommendations and requirements of other sections.
- 3.2 INSTALLATION
 - A. Rig and install in full accordance with manufacturer's requirements, project drawings, and contract documents. Refer to the manufacturer's installation manual for full requirements.
 - B. Locate indoor and outdoor units as indicated on drawings. Provide service clearance per manufacturer's installation manual. Provide steel mounting frame to hold units 18" above mounting surface. Adjust and level outdoor units on support structure.
 - C. Where indoor casette units are installed in lay-in ceilings, provide manufacturer's support panel.
 - D. Installing contractor shall provide and install all accessories and piping for a fully operational system. Refer to manufacturer's installation manual for full instructions.
 - 1. Traps, filter driers, and sight glasses are NOT to be installed on the refrigerant piping or condensate lines.
 - 2. Standard ACR fittings rated for use with R410A are to be used for all connections. Proprietary manufacturer-specific appurtenances are not allowed.
 - 3. Refrigerant pipe for CITY MULTI shall be made of phosphorus deoxidized copper, and has two types:
 - a. ACR "Annealed": Soft copper pipe, can be easily bent with human's hand.
 - b. ACR "Drawn Temper": Hard copper pipe (Straight pipe), being stronger than Type-O pipe of the same radical thickness.
 - 4. The maximum operation pressure of R410A air conditioner is 4.30 MPa. The refrigerant piping should ensure the safety under the maximum operation pressure. Refer to recommend piping specifications in Mitsubishi Electric's engineering manual. Pipes of radial thickness 0.7mm or less shall not be used.

- 5. Brazed connections shall be used unless not permitted by manufacturer. Where manufacturer's flare fittings cannot be removed to allow sufficient pipe for brazing, flared connection may be used.
- E. Insulation: Refrigerant lines, as well as any valves, shall be insulated end to end with ¹/₂" closed-cell pipe insulation for piping up to 1"in diameter, or ³/₄" for piping 1-1/8" and larger, with a thermal conductivity no less than 0.27 BTU-in/hr sq.ft F. If state or local codes require insulation other than that specified above, the greater insulation shall be used.
- F. Electrical: Installing contractor shall coordinate electrical requirements and connections for all power feeds with electrical contractor. Refer to Division 26 for additional information.
- G. Manufacturer Representative's Responsibilities:
 - 1. The manufacturer's representative (equipment supplier) shall include & provide the following VRFZ Installation / Startup / Commissioning field services:
 - a. Construction Phase
 - 1) The equipment supplier shall coordinate a jobsite walkthrough with the installing contractor prior to equipment installation and advise on installation, refrigerant piping and control wiring best practices.
 - 2) The equipment supplier shall be responsible for setting up the VFRZ equipment to meet project requirements including setting unit addresses and unit dip switches.
 - b. Startup Services
 - Contractor shall be responsible for leak testing and evacuation of field installed refrigerant lines to meet TRANE requirements. Once the system passes all requirements, contractor shall charge with additional refrigerant as determined by equipment supplier.
 - 2) System startup shall be provided by equipment supplier.
 - 3) The central control system shall be setup and commissioned by equipment supplier.
 - c. System Commissioning
 - 1) All VRFZ equipment model and serial numbers shall be recorded.
 - 2) Unit address confirmed and recorded for each unit.
 - One hour system run test shall be recorded via manufacturer's maintenance hardware / software. The record must be submitted to the manufacturer to be eligible for the extended system parts warranty.
 - 2. The installing contractor shall assist the Manufacturer's Representative as required.

SECTION 238300 RADIANT HEATING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Indoor electric floor warming.

1.2 RELATED REQUIREMENTS

A. Section 262717 - Equipment Wiring: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

PART 2 PRODUCTS

1

2.1 INDOOR ELECTRIC FLOOR WARMING

- A. Electric Mat:
 - Manufacturers:
 - a. Watts Radiant
 - b. Substitutions: See Section 016000 Product Requirements.
 - 2. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
 - 3. Assembly:
 - a. Mat: Fabricated of flexible thermoplastic polymer coated fiberglass, porous nylon polyester, or polypropylene mesh.
 - b. Conductor(s): Factory insulated copper or copper alloy wiring with tin, tin alloy, or standard factory coating.
 - c. Provide factory spliced and sealed cold lead with single point connection of sufficient length to reach designated junction boxes or power panel.
 - d. Jacketing: Polyvinylidene fluoride (PVDF), High density polyethylene (HDPE), Polyvinyl chloride (PVC), or Ethylene propylene rubber polyolefin (EPR Polyolefin).
 - 4. Controls:
 - a. Provide factory thermostat with floor sensor as indicated.
 - b. Include programmable, temperature set-back capability, digital readout, and relays for control of multiple circuits of floor mat.
 - c. Controls to be stand-alone.
 - d. Thermostat and relay modules to include integral GFCI protection.
 - 5. Accessories:
 - a. Monitor for detecting cable damage during installation.
 - 6. Electrical Characteristics: on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Indoor Floor Warming with Electric Mats:
 - 1. Verify field measurements are as indicated on shop drawings.
 - 2. Verify required power is available, in proper location, and ready for use.
 - 3. Verify the proper installation of substrates prior to installing radiant floor system.
 - 4. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean all surfaces prior to installation.
- B. Electric Mats: 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 in accordance with manufacturer's recommendations.
- B. Indoor Floor Warming with Electric Mat:
 - 1. Comply with manufacturer's product data, including product technical bulletins, installation instructions, and design drawings.
 - 2. Complete installation must comply with NFPA and appropriate local codes.

3.4 FIELD QUALITY CONTROL

- A. Indoor Floor Warming with Electric Mat:
 - 1. Utilize manufacturer's recommended cable continuity device during installation.
 - 2. Test each mat heater for ohms, with a digital ohms meter before and after the installation of LVT substrate.
 - 3. If required, record these values on the manufacturer's warranty form.
 - 4. Allow mortar to cure fully for 3 to 28 days as determined by the mortar manufacturer prior to start-up (first-time activation).
 - 5. Perform testing of voltage and amps by a licensed electrician during start-up.
 - 6. Provide copies off all testing records to Owner.

3.5 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Indoor Floor Warming with Electric Cable or Mat: Do not permit traffic over unprotected floor surface.

SECTION 260501 ELECTRICAL DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition.

PART 2 PRODUCTS (N/A)

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Disconnect and remove electrical systems where required.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Fire Alarm System: Maintain existing system in service. Disable system only to make connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. Make temporary connections to maintain service in areas adjacent to work area.
- 3.3 DEMOLITION OF ELECTRICAL WORK
 - A. Remove existing electrical installations throughout the project areas as required for new work.
 - B. Remove abandoned equipment, conduit, and wiring.
 - C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
 - D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed.
 - E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 - F. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
 - G. Repair adjacent construction and finishes damaged during demolition.
 - H. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
 - I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- 3.4 CLEANING AND REPAIR
 - A. Clean and repair existing materials and equipment that remain or that are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Wire pulling lubricant.
- F. Cable ties.

1.2 RELATED REQUIREMENTS

- A. Section 078400 Firestopping.
- B. Section 260526 Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 260536 Cable Trays for Electrical Systems: Additional installation requirements for cables installed in cable tray systems.
- D. Section 260553 Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

- A. ASTM B3 Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).
- C. ASTM B33 Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.
- F. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- G. NECA 120 Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.
- H. NEMA WC 70 Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- I. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 44 Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 83 Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 486A-486B Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486C Splicing Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486D Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- O. UL 510 Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- P. UL 1569 Metal-Clad Cables; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:

- 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
- 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
- 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.6 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is permitted only as follows:
 - 1. Where not otherwise restricted, may be used:
 - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
 - 1) Maximum Length: 6 feet.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:
 - 1. Branch Circuits: 12 AWG.

- I. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.

2.3 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

2.4 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 - 1. Size 10 AWG and Smaller: Solid.
 - 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

2.5 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- D. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- F. Mechanical Connectors: Provide bolted type or set-screw type.
- G. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.6 WIRING ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- H. Terminate cables using suitable fittings.
 - Metal-Clad Cable (Type MC):
 - a. Use listed fittings.

1.
- b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.
- 1.2 RELATED REQUIREMENTS
 - A. Section 260519 Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
 - B. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- 1.3 REFERENCE STANDARDS
 - A. IEEE 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.
 - B. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
 - C. NEMA GR 1 Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
 - D. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - E. UL 467 Grounding and Bonding Equipment; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
 - B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Field quality control test reports.
- D. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

- 2.1 GROUNDING AND BONDING REQUIREMENTS
 - A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
 - B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
 - D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - E. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
 - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.
 - F. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
 - 3. Metal Building or Structure Frame:
 - a. Provide connection to metal building or structure frame effectively grounded in accordance with NFPA 70 at nearest accessible location.
 - 4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
 - 5. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
 - G. Service-Supplied System Grounding:
 - 1. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

- H. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 - 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 - 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1.

- 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
- 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
 - Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
 - 1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 - 2. Size: As indicated.
 - 3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
 - 1. Comply with NEMA GR 1.
 - 2. Material: Copper-bonded (copper-clad) steel.
 - 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 260553.

3.3 FIELD QUALITY CONTROL

- A. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- B. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- C. Submit detailed reports indicating inspection and testing results and corrective actions taken.

SECTION 260529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 260534 Conduit: Additional support and attachment requirements for conduits.
- B. Section 260536 Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- C. Section 260537 Boxes: Additional support and attachment requirements for boxes.
- D. Section 265100 Interior Lighting: Additional support and attachment requirements for interior luminaires.

1.3 REFERENCE STANDARDS

- A. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- D. MFMA-4 Metal Framing Standards Publication; 2004.
- E. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- 1.5 SUBMITTALS
 - A. See Section 013000 Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- 1.6 QUALITY ASSURANCE
 - A. Comply with NFPA 70.
 - B. Comply with applicable building code.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

- 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
- 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
- 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
- Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel or zinc-plated steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Single Conduit up to 1 inch (27mm) trade size: 1/4 inch diameter.
 - c. Single Conduit larger than 1 inch (27mm) trade size: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
 - e. Outlet Boxes: 1/4 inch diameter.
 - f. Luminaires: 1/4 inch diameter.
- F. Anchors and Fasteners:

1.

- 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
- 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
- 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
- 4. Hollow Masonry: Use toggle bolts.
- 5. Hollow Stud Walls: Use toggle bolts.
- 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
- 7. Sheet Metal: Use sheet metal screws.
- 8. Plastic and lead anchors are not permitted.
- 9. Powder-actuated fasteners are not permitted.
- 10. Hammer-driven anchors and fasteners are not permitted.
- 11. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as shown on the drawings.
 - B. Verify that mounting surfaces are ready to receive support and attachment components.
 - C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
 - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Conduit Support and Attachment: Also comply with Section 260534.
- I. Box Support and Attachment: Also comply with Section 260537.
- J. Interior Luminaire Support and Attachment: Also comply with Section 265100.
- K. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- L. Secure fasteners according to manufacturer's recommended torque settings.
- M. Remove temporary supports.
- 3.3 FIELD QUALITY CONTROL
 - A. Inspect support and attachment components for damage and defects.
 - B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
 - C. Correct deficiencies and replace damaged or defective support and attachment components.

SECTION 260534 CONDUIT

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 260519 Low-Voltage Electrical Power Conductors and Cables.
- B. Section 260526 Grounding and Bonding for Electrical Systems.
 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 260529 Hangers and Supports for Electrical Systems.
- D. Section 260537 Boxes.
- E. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- F. Section 262100 Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.
- G. Section 271000 Structured Cabling: Additional requirements for communications systems conduits.

1.3 REFERENCE STANDARDS

- A. ANSI C80.1 American National Standard for Electrical Rigid Steel Conduit (ERSC); 2015.
- B. ANSI C80.3 American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.
- C. ANSI C80.6 American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- D. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 101 Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- F. NECA 111 Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- G. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- H. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- I. NEMA TC 3 Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.
- J. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 6 Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- M. UL 360 Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- N. UL 514B Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- O. UL 651 Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- P. UL 797 Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

- Q. UL 1242 Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
 - B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit, intermediate metallic conduit (IMC), or rigid PVC conduit.
 - 3. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
 - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.

- 6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection.
- 7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Within Slab Above Ground: Not permitted.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 8 feet, except within electrical and communication rooms or closets.
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- L. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- M. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.
- N. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - Vibrating equipment includes, but is not limited to:
 a. Motors.
- 2.2 CONDUIT REQUIREMENTS
 - A. Electrical Service Conduits: Also comply with Section 262100.
 - B. Communications Systems Conduits: Also comply with Section 271000.
 - C. Fittings for Grounding and Bonding: Also comply with Section 260526.
 - D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
 - E. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - F. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 1/2 inch (16 mm) trade size.
 - 2. Control Circuits: 1/2 inch (16 mm) trade size.
 - 3. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
 - 4. Underground, Interior: 3/4 inch (21 mm) trade size.
 - 5. Underground, Exterior: 3/4 inch (21 mm) trade size.
 - G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:

- 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
- 2. Republic Conduit: www.republic-conduit.com/#sle.
- 3. Wheatland Tube Company: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:

- 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.
- 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube Company: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.5 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc: www.afcweb.com.
 - 2. Electri-Flex Company: www.electriflex.com.
 - 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:

- 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
- 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
- 3. Material: Use steel or malleable iron.

2.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:

- 1. AFC Cable Systems, Inc: www.afcweb.com.
- 2. Electri-Flex Company: www.electriflex.com.
- 3. International Metal Hose: www.metalhose.com.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
- 2.7 ELECTRICAL METALLIC TUBING (EMT)
 - A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube Company: www.wheatland.com.
 - B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
 - C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Industrial Automation: www.emersonindustrial.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.8 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Manufacturers:
 - 1. Cantex Inc: www.cantexinc.com/#sle.
 - 2. Carlon, a brand of Thomas & Betts Corporation: www.carlon.com/#sle.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
- 2.9 ACCESSORIES
 - A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
 - B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated and routing is not shown, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Unless otherwise approved, do not route conduits exposed:
 - a. Across floors.
 - b. Across roofs.
 - c. Across top of parapet walls.
 - d. Across building exterior surfaces.
 - 6. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 7. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 8. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 9. Arrange conduit to provide no more than 150 feet between pull points.
 - 10. Route conduits above water and drain piping where possible.
 - 11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 - 13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 14. Group parallel conduits in the same area together on a common rack.
- G. Conduit Support:

- 1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
- 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
- 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
- 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
- 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
- 8. Use of wire for support of conduits is not permitted.
- H. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- I. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.
 - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 - 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
 - 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 8. Provide metal escutcheon plates for conduit penetrations exposed to public view.
 - 9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- J. Underground Installation:
 - 1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 - 2. Provide underground warning tape in accordance with Section 260553 along entire conduit length for service entrance where not concrete-encased.
- K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section 033000 with minimum concrete cover of 3 inches on all sides unless otherwise indicated.

- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
 - 1. Where conduits pass from outdoors into conditioned interior spaces.
 - 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
 - 3. Where conduits penetrate coolers or freezers.
- N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- O. Provide grounding and bonding in accordance with Section 260526.
- P. Identify conduits in accordance with Section 260553.
- 3.3 FIELD QUALITY CONTROL
 - A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
 - B. Correct deficiencies and replace damaged or defective conduits.
- 3.4 CLEANING
 - A. Clean interior of conduits to remove moisture and foreign matter.
- 3.5 PROTECTION
 - A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

SECTION 260537 BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED REQUIREMENTS

- A. Section 260526 Grounding and Bonding for Electrical Systems.
- B. Section 260529 Hangers and Supports for Electrical Systems.
- C. Section 260534 Conduit:
 - 1. Conduit bodies and other fittings.
 - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- E. Section 262726 Wiring Devices:
 - 1. Wall plates.
 - 2. Floor box service fittings.
 - 3. Additional requirements for locating boxes for wiring devices.
- F. Section 271000 Structured Cabling: Additional requirements for communications systems outlet boxes.

1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.
- D. NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 Specification for Underground Enclosure Integrity; 2017.
- H. UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 514A Metallic Outlet Boxes; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

- 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
- 6. Coordinate the work with other trades to preserve insulation integrity.
- 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
- 8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, junction and pull boxes, cabinets and enclosures, and floor boxes.
 - 1. Underground Boxes/Enclosures: Include reports for load testing in accordance with SCTE 77 certified by a professional engineer or an independent testing agency upon request.
- C. Project Record Documents: Record actual locations for pull boxes, cabinets and enclosures, and floor boxes.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. Keys for Lockable Enclosures: Two of each different key.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
 - 4. Use suitable concrete type boxes where flush-mounted in concrete.
 - 5. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 6. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 7. Use shallow boxes where required by the type of wall construction.
 - 8. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

- 11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
- 12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
- 13. Minimum Box Size, Unless Otherwise Indicated:
 - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
 - b. Communications Systems Outlets: Comply with Section 271000.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
- 14. Wall Plates: Comply with Section 262726.
- 15. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation; _____: www.cooperindustries.com/#sle.
 - b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com.
 - c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com.
 - d. Thomas & Betts Corporation: www.tnb.com.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 - Junction and Pull Boxes Larger Than 100 cubic inches:
 a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.
 - 5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
 - 6. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com.
 - c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com.
- D. Underground Boxes/Enclosures:
 - 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
 - 2. Size: As indicated on drawings.
 - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
 - 4. Provide logo on cover to indicate type of service.
 - 5. Applications:
 - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 8 load rating.
 - b. Parking Lots, in Areas Subject Only To Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77, Tier 15 load rating.
 - c. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
 - 6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
 - a. Manufacturers:
 - 1) Hubbell Incorporated; Quazite Products: www.hubbellpowersystems.com.
 - 2) Oldcastle Precast, Inc: www.oldcastleprecast.com.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on drawings.

- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- G. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels as required where approved by the Architect.
 - 2. Unless dimensioned, box locations indicated are approximate.
 - Locate boxes as required for devices installed under other sections or by others.
 a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
 - b. Communications Systems Outlets: Comply with Section 271000.
 - 4. Locate boxes so that wall plates do not span different building finishes.
 - 5. Locate boxes so that wall plates do not cross masonry joints.
 - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
 - 8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
 - 9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
 - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
 - b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
 - 10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260534.
 - 11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
 - a. Concealed above accessible suspended ceilings.
 - b. Within joists in areas with no ceiling.
 - c. Electrical rooms.
 - d. Mechanical equipment rooms.
- H. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

- 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- 4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
- M. Underground Boxes/Enclosures:
 - 1. Install enclosure on gravel base, minimum 6 inches deep.
 - 2. Flush-mount enclosures located in concrete or paved areas.
 - 3. Mount enclosures located in landscaped areas with top at 1 inch above finished grade.
 - 4. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- N. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- P. Close unused box openings.
- Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- R. Provide grounding and bonding in accordance with Section 260526.
- S. Identify boxes in accordance with Section 260553.

3.3 CLEANING

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

3.4 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

SECTION 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Floor marking tape.
- G. Warning signs and labels.

1.2 RELATED REQUIREMENTS

- A. Section 099113 Exterior Painting.
- B. Section 099123 Interior Painting.
- C. Section 260519 Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- D. Section 260536 Cable Trays for Electrical Systems: Additional identification requirements for cable tray systems.
- E. Section 271000 Structured Cabling: Identification for communications cabling and devices.

1.3 REFERENCE STANDARDS

- A. ANSI Z535.2 American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 Marking and Labeling Systems; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
 - B. Sequencing:
 - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
 - 2. Do not install identification products until final surface finishes and painting are complete.
- 1.5 SUBMITTALS
 - A. See Section 013000 Administrative Requirements for submittals procedures.
 - B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- 1.6 QUALITY ASSURANCE
 - A. Conform to requirements of NFPA 70.
- 1.7 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

- 2.1 IDENTIFICATION REQUIREMENTS
 - A. Identification for Equipment:

- 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
 - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 6) For power panelboards, use identification nameplate to identify load(s) served for each branch device.
 - b. Enclosed switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location when not within sight of equipment.
 - c. Time Switches:
 - 1) Identify load(s) served and associated circuits controlled. Include location.
 - d. Enclosed Contactors:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify coil voltage.
 - 4) Identify load(s) and associated circuits controlled. Include location.
- 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
- 3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
- 4. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
 - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches wide, painted in accordance with Section 099123 and 099113.
- 5. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 - 2. Identification for Communications Conductors and Cables: Comply with Section 271000.
 - 3. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
 - 4. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
 - a. At each source and load connection.
 - b. Within boxes when more than one circuit is present.

- 5. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- 6. Use underground warning tape to identify direct buried cables.
- C. Identification for Raceways:
 - 1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
 - a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
 - 1) Color Code:
 - (a) Fire Alarm System: Red.
 - 2) Field-Painting: Comply with Section 099123 and 099113.
 - 3) Vinyl Color Coding Electrical Tape: Comply with Section 260519.
 - 2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
 - 3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
 - 4. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
 - 1. Use voltage markers to identify highest voltage present.
 - 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Section 099123 and 099113 per the following color code:.
 - 1) Fire Alarm System: Red.
 - b. For exposed boxes in public areas, do not color code.
 - 3. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
 - a. For exposed boxes in public areas, use only identification labels.
- E. Identification for Devices:
 - 1. Use identification label, engraved wallplate, or handwritten text using indelible marker to identify serving branch circuit for all receptacles.
 - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
 - 2. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.
 - 3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.
- F. Identification for Luminaires:
 - 1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.

- 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. System designation where applicable:
 - 1) Fire Alarm System: Identify with text "FIRE ALARM".
 - b. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height:
 - a. System Designation: 1 inch.
 - b. Equipment Designation: 1/2 inch.
 - 5. Color:
 - a. Normal Power System: White text on black background.
 - b. Fire Alarm System: White text on red background.
- D. Format for General Information and Operating Instructions:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/4 inch.
 - 5. Color: Black text on white background unless otherwise indicated.
- E. Format for Caution and Warning Messages:
 - 1. Minimum Size: 2 inches by 4 inches.
 - 2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 1/2 inch.
 - 5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Control Device Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Load controlled or other designation indicated.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Black text on white background.
- G. Format for Fire Alarm Device Identification:
 - 1. Minimum Size: 3/8 inch by 1.5 inches.
 - 2. Legend: Designation indicated and device zone or address.
 - 3. Text: All capitalized unless otherwise indicated.
 - 4. Minimum Text Height: 3/16 inch.
 - 5. Color: Red text on white background.

2.3 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

- A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- C. Minimum Size:
 - 1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
 - 2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 - 3. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- D. Legend:
 - 1. Markers for Voltage Identification: Highest voltage present.
 - 2. Markers for System Identification:
- E. Color: Black text on orange background unless otherwise indicated.

2.5 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 - 1. Tape for Buried Power Lines: Black text on red background.
 - 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.
- 2.6 FLOOR MARKING TAPE
 - A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches wide, with alternating black and white stripes.
- 2.7 WARNING SIGNS AND LABELS
 - A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
 - B. Warning Signs:
 - 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
 - C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Enclosure front.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Branch Devices: Adjacent to device.
 - 6. Interior Components: Legible from the point of access.
 - 7. Conduits: Legible from the floor.
 - 8. Boxes: Outside face of cover.
 - 9. Conductors and Cables: Legible from the point of access.
 - 10. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
 - 1. Do not use adhesives on exterior surfaces except where substrate can not be penetrated.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.
- 3.3 FIELD QUALITY CONTROL
 - A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

SECTION 260923 LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Occupancy sensors.
- B. In-wall interval timers.
- C. Lighting contactors.
- D. Control accessories.

1.2 RELATED REQUIREMENTS

- A. Section 260529 Hangers and Supports for Electrical Systems.
- B. Section 260537 Boxes.
- C. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- D. Section 262726 Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NEMA ICS 2 Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).
- E. NEMA ICS 5 Industrial Control and Systems: Control Circuit and Pilot Devices; 2017.
- F. NEMA ICS 6 Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- G. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 916 Energy Management Equipment; Current Edition, Including All Revisions.
- I. UL 917 Clock-Operated Switches; Current Edition, Including All Revisions.
- J. UL 60947-1 Low-Voltage Switchgear and Controlgear Part 1: General Rules; Current Edition, Including All Revisions.
- K. UL 60947-4-1 Low-Voltage Switchgear and Controlgear Part 4-1: Contactors and Motor-starters Electromechanical Contactors and Motor-starters; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
 - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

- C. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- D. Field Quality Control Reports.
- E. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- 1.6 QUALITY ASSURANCE
 - A. Conform to requirements of NFPA 70.
 - B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
 - C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND PROTECTION
 - A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.8 WARRANTY

A. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

- 2.1 LIGHTING CONTROL DEVICES GENERAL REQUIREMENTS
 - A. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
- 2.2 OCCUPANCY SENSORS
 - A. Manufacturers:
 - 1. Hubbell Incorporated; ____: www.hubbell.com/#sle.
 - 2. WattStopper; _____: www.wattstopper.com/#sle.
 - B. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
 - b. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 - 5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
 - 6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
 - 7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
 - 8. Sensitivity: Field adjustable.

- 9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
- 10. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.
- C. Wall Switch Occupancy Sensors:
 - 1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.
 - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
 - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
 - e. Finish: Color to be selected by Architect.
- D. Power Packs for Low Voltage Occupancy Sensors:
 - 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
 - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.
 - 3. Input Supply Voltage: Dual rated for 120/277 V ac.

2.3 IN-WALL INTERVAL TIMERS

- A. Spring Wound In-Wall Interval Timers:
 - 1. Description: Factory-assembled controller with mechanical spring wound timing mechanism requiring no electricity to operate; suitable for mounting in standard wall box; rotary control operator with matching wall plate factory marked with time interval units; listed and labeled as complying with UL 916 or UL 917.
 - 2. Program Capability: Designed to turn load off at end of preset time interval.
 - 3. Time Interval: User selectable from zero up to 2 hours.
 - 4. Switch Configuration: SPST.
 - 5. Contact Ratings:
 - a. Resistive Load: Not less than 20 A at 120 V ac or 10 A at 277 V ac.
 - b. Inductive Load: Not less than 20 A at 120 V ac or 10 A at 277 V ac.
 - c. Tungsten Load: Not less than 7 A at 120 V ac.
 - d. Motor Load: Not less than 1 HP at 120 V ac or 2 HP at 250 V ac.

2.4 LIGHTING CONTACTORS

- A. Description: Magnetic lighting contactors complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; noncombination type unless otherwise indicated; ratings, configurations and features as indicated on the drawings.
- B. Enclosures:

3.

- 1. Comply with NEMA ICS 6.
- 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 12.
 - Finish: Manufacturer's standard unless otherwise indicated.

2.5 CONTROL ACCESSORIES

- A. Auxiliary Contacts:
 - 1. Comply with NEMA ICS 5.

2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each lighting contactor, minimum.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as indicated.
 - B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
 - C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
 - D. Verify that final surface finishes are complete, including painting.
 - E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
 - F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
 - G. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
 - b. In-Wall Interval Timers: 48 inches above finished floor.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.
- G. Provide required supports in accordance with Section 260529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- I. Occupancy Sensor Locations:
 - 1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.
- J. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- K. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

3.3 FIELD QUALITY CONTROL

- A. See Section 014000 Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.

- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.4 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

3.5 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
 - 4. Location: At project site.
SECTION 262100 LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical service requirements.
- 1.2 RELATED REQUIREMENTS
 - A. Section 260519 Low-Voltage Electrical Power Conductors and Cables.
 - B. Section 260526 Grounding and Bonding for Electrical Systems.
 - C. Section 260529 Hangers and Supports for Electrical Systems.
 - D. Section 260534 Conduit.
 - E. Section 260553 Identification for Electrical Systems: Identification products and requirements.
 - F. Section 262413 Switchboards: Service entrance equipment.1. Includes non-utility electrical metering.
 - G. Section 262818 Enclosed Switches: Service entrance equipment.
 - H. Section 264300 Surge Protective Devices: Service entrance surge protective devices.
- 1.3 DEFINITIONS
 - A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.4 REFERENCE STANDARDS

- A. IEEE C2 National Electrical Safety Code; 2017.
- B. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Contractor..
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.6 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
 - 4. The requirements of the local authorities having jurisdiction.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility: As indicated on drawings.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as shown on drawings.
 - B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
 - C. Verify that conditions are satisfactory for installation prior to starting work.
- 3.2 INSTALLATION
 - A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
 - B. Perform work in a neat and workmanlike manner in accordance with NECA 1.
 - C. Arrange equipment to provide minimum clearances and required maintenance access.
 - D. Provide required support and attachment components in accordance with Section 260529.
 - E. Provide grounding and bonding for service entrance equipment in accordance with Section 260526.
 - F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 260553.
- 3.3 PROTECTION
 - A. Protect installed equipment from subsequent construction operations.

SECTION 262416 PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

- A. Section 260526 Grounding and Bonding for Electrical Systems.
- B. Section 260526 Grounding and Bonding for Electrical Systems.
- C. Section 260529 Hangers and Supports for Electrical Systems.
- D. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- E. Section 264300 Surge Protective Devices.

1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 407 Standard for Installing and Maintaining Panelboards; 2015.
- C. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NEMA PB 1 Panelboards; 2011.
- E. NEMA PB 1.1 General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- F. NETA ATS Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.
- G. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 50E Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 67 Panelboards; Current Edition, Including All Revisions.
- K. UL 489 Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- L. UL 869A Reference Standard for Service Equipment; Current Edition, Including All Revisions.
- M. UL 943 Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- B. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- C. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.1. Panelboard Keys: Two of each different key.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
 - B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
 - C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.
- 1.8 FIELD CONDITIONS
 - A. Maintain ambient temperature within the following limits during and after installation of panelboards:
 1. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com.
- B. Schneider Electric; Square D Products: www.schneider-electric.us.
- 2.2 PANELBOARDS GENERAL REQUIREMENTS
 - A. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
 - C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating as indicated on the drawings.
 - 2. Listed series ratings are not acceptable.
 - D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
 - E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
 - F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
 - G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - b. Increase gutter space as required where sub-feed lugs, feed-through lugs, gutter taps, or oversized lugs are provided.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 - c. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 264300, list and label panelboards as a complete assembly including surge protective device.
- L. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.
- M. Load centers are not acceptable.
- 2.3 POWER DISTRIBUTION PANELBOARDS
 - A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
 - B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
 - C. Bussing:
 - 1. Phase and Neutral Bus Material: Aluminum or copper.
 - 2. Ground Bus Material: Aluminum or copper.
 - D. Circuit Breakers:
 - 1. Provide bolt-on type.
 - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
 - E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

- 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Aluminum or copper.
 - 3. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Fronts: Provide lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 - 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - 7. Do not use tandem circuit breakers.
 - 8. Do not use handle ties in lieu of multi-pole circuit breakers.
 - 9. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

2.6 SOURCE QUALITY CONTROL

A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required supports in accordance with Section 260529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling.
- J. Provide grounding and bonding in accordance with Section 260526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- M. Provide filler plates to cover unused spaces in panelboards.
- N. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads where indicated. Also provide for the following:
 - 1. Fire detection and alarm circuits.
 - 2. Intrusion detection and access control system circuits.
- O. Identify panelboards in accordance with Section 260553.
- 3.3 FIELD QUALITY CONTROL
 - A. Inspect and test in accordance with NETA ATS, except Section 4.
 - B. Test GFCI circuit breakers to verify proper operation.
 - C. Test shunt trips to verify proper operation.
 - D. Correct deficiencies and replace damaged or defective panelboards or associated components.
- 3.4 ADJUSTING
 - A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
 - B. Adjust alignment of panelboard fronts.
- 3.5 CLEANING
 - A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
 - B. Repair scratched or marred exterior surfaces to match original factory finish.

SECTION 262717 EQUIPMENT WIRING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical connections to equipment.

1.2 RELATED REQUIREMENTS

- A. Section 260519 Low-Voltage Electrical Power Conductors and Cables.
- B. Section 260534 Conduit.
- C. Section 260537 Boxes.
- D. Section 262726 Wiring Devices.
- E. Section 262818 Enclosed Switches.

1.3 REFERENCE STANDARDS

- A. NEMA WD 1 General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- B. NEMA WD 6 Wiring Devices Dimensional Specifications; 2016.
- C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

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

1.5 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Disconnect Switches: As specified in Section 262818 and in individual equipment sections.
- B. Wiring Devices: As specified in Section 262726.
- C. Flexible Conduit: As specified in Section 260534.
- D. Wire and Cable: As specified in Section 260519.
- E. Boxes: As specified in Section 260537.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that equipment is ready for electrical connection, wiring, and energization.
- 3.2 ELECTRICAL CONNECTIONS
 - A. Make electrical connections in accordance with equipment manufacturer's instructions.
 - B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

SECTION 262726 WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.2 RELATED REQUIREMENTS

- A. Section 260526 Grounding and Bonding for Electrical Systems.
- B. Section 260537 Boxes.
- C. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- D. Section 260923 Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors.
- E. Section 271005 Structured Cabling for Voice and Data Inside-Plant: Voice and data jacks.

1.3 REFERENCE STANDARDS

- A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA WD 1 General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- D. NEMA WD 6 Wiring Devices Dimensional Specifications; 2016.
- E. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 20 General-Use Snap Switches; Current Edition, Including All Revisions.
- G. UL 498 Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- H. UL 514D Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- I. UL 943 Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- J. UL 1472 Solid-State Dimming Controls; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
 - B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.
- 1.5 SUBMITTALS
 - A. See Section 013000 Administrative Requirements, for submittal procedures.
 - B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

- 1. Wall Dimmers: Include derating information for ganged multiple devices.
- C. Project Record Documents: Record actual installed locations of wiring devices.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Keys for Locking Switches: Two of each type.
 - 2. Extra Wall Plates: One of each style, size, and finish.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
 - A. Hubbell Incorporated: www.hubbell-wiring.com.
 - B. Leviton Manufacturing Company, Inc: www.leviton.com.
 - C. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
 - D. Arrow Hart, a brand of Eaton Corp.: www.arrowhart.com.
 - E. Source Limitations: Where possible, provide products for each type of wiring device produced by a single manufacturer and obtained from a single supplier.

2.2 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles throughtout where installed below 6' AFF.
- E. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- F. Provide GFCI protection for receptacles installed in kitchens.
- G. Provide GFCI protection for receptacles serving electric drinking fountains.
- H. Unless noted otherwise, do not use combination switch/receptacle devices.
- 2.3 WIRING DEVICE FINISHES
 - A. Provide wiring device finishes as described below unless otherwise indicated.
 - B. Wiring Devices Installed in Finished Spaces: Gray with stainless steel wall plate.
 - C. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- 2.4 WALL SWITCHES
 - A. Wall Switches General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
 - B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

C. Locking Wall Switches: Industrial specification grade, 20 A, 120/277 V with lever type keyed switch actuator and maintained contacts; switches keyed alike; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.5 WALL DIMMERS

- A. Wall Dimmers General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- B. Dimmer Type: 4-wire, 0-10V, with integral power pack
- C. Control: Slide control type with separate on/off switch.
- D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:
 1. LED 0-10V: 1200 VA at 120VAC
- E. Wall Dimmers must be compatible with LED drivers provided with luminaires.

2.6 RECEPTACLES

- A. Receptacles General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - Isolated Ground Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, with ground contacts isolated from mounting strap; isolated ground triangle mark on device face; single or duplex as indicated on the drawings.
 - Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
 - 4. Tamper Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
 - 5. Tamper Resistant and Weather Resistant Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:
 - 1. GFCI Receptacles General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
 - 4. Tamper Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type.
 - Tamper Resistant and Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.7 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- C. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as shown on the drawings.
 - B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
 - C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
 - D. Verify that final surface finishes are complete, including painting.
 - E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
 - F. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.
- 3.3 INSTALLATION
 - A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130.
 - B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Wall Dimmers: 48 inches above finished floor.
 - c. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
 - 5. Locate receptacles for electric drinking fountains flush in wall adjacent to, or below, housing of drinking fountain..
 - C. Install wiring devices in accordance with manufacturer's instructions.
 - D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
 - E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. For isolated ground receptacles, connect wiring device grounding terminal only to identified branch circuit isolated equipment grounding conductor. Do not connect grounding terminal to outlet box or normal branch circuit equipment grounding conductor.
- I. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- J. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- K. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- L. Install wall switches with OFF position down.
- M. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- N. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
- O. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- P. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.4 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch with circuit energized to verify proper operation.
- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.5 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust coverplate screws to be uniformly horizontal or vertical.
- C. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.
- 3.6 CLEANING
 - A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

SECTION 262818 ENCLOSED SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Enclosed safety switches.
- 1.2 RELATED REQUIREMENTS
 - A. Section 260526 Grounding and Bonding for Electrical Systems.
 - B. Section 260529 Hangers and Supports for Electrical Systems.
 - C. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- 1.3 REFERENCE STANDARDS
 - A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
 - B. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
 - C. NEMA KS 1 Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
 - D. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - E. UL 50 Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
 - F. UL 50E Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
 - G. UL 98 Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Project Record Documents: Record actual locations of enclosed switches.
- D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.6 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

1.8 FIELD CONDITIONS

A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Eaton Corporation: www.eaton.com.
- B. Schneider Electric; Square D Products: www.schneider-electric.us.
- C. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Provide with switch blade contact position that is visible when the cover is open.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- L. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Provide mechanical lugs unless otherwise indicated.
 - b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as shown on the drawings.
 - B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
 - C. Verify that mounting surfaces are ready to receive enclosed safety switches.
 - D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Install enclosed switches in accordance with manufacturer's instructions.
- B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 260529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.

3.3 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.4 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

SECTION 264300 SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surge protective devices for service entrance locations.
- B. Surge protective devices for distribution locations.
- C. Surge protective devices for branch panelboard locations.
- 1.2 RELATED REQUIREMENTS
 - A. Section 260526 Grounding and Bonding for Electrical Systems.
 - B. Section 262416 Panelboards.
- 1.3 ABBREVIATIONS AND ACRONYMS
 - A. SPD: Surge Protective Device.
- 1.4 REFERENCE STANDARDS
 - A. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
 - B. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
 - C. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
 - D. UL 1449 Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to ordering equipment.
- 1.6 SUBMITTALS
 - A. See Section 013000 Administrative Requirements, for submittal procedures.
 - B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
 - C. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
 1. UL 1449.
 - D. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.
 - E. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.
- 1.9 WARRANTY
 - A. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

B. Exclude surge protective devices from any clause limiting warranty responsibility for acts of nature, including lightning, stated elsewhere.

PART 2 PRODUCTS

- 2.1 MANUFACTURERS
 - A. Field-installed, Externally Mounted Surge Protective Devices:
 - 1. ABB/GE; ____: www.geindustrial.com/#sle.
 - 2. Current Technology; a brand of Thomas & Betts Power Solutions; _____: www.tnbpowersolutions.com/#sle.
 - 3. Schneider Electric; Square D Brand Surgelogic Products; _____: www.surgelogic.com/#sle.
 - B. Factory-installed, Internally Mounted Surge Protective Devices:
 - 1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.
 - C. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

2.2 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mouonted SPDs.
- C. Protected Modes:
 - 1. Wye Systems: L-N, L-G, N-G, L-L.
- D. UL 1449 Voltage Protection Ratings (VPRs):
 - 1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
- E. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- F. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 1. Indoor clean, dry locations: Type 1.
 - 2. Outdoor locations: Type 3R.
- G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
 - 1. Panelboards: See Section 262416.

2.3 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

- A. Distribution locations include SPDs connected to distribution panelboards.
- B. Surge Protective Device:
 - 1. Protection Circuits: Field-replaceable modular or non-modular.
 - 2. Surge Current Rating: Not less than 80 kA per mode/160 kA per phase.
 - 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 - 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 - 5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - 6. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

C. Diagnostics:

- 2.4 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS
 - A. Unless otherwise indicated, provide factory-installed, internally mounted SPDs.
 - B. List and label as complying with UL 1449, Type 1 or Type 2.
 - C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.
 - D. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.
 - E. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 - F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the short circuit current rating of the equipment the SPD is connected to, including any series ratings.
 - G. Diagnostics:
 - 1. Protection Status Monitoring: Provide indicator lights to report the protection status.
 - 2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - 3. Remote Status Monitoring: Provide Form C dry type contacts (normally open and normally closed) for remote annunciation of status.
 - 4. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
 - H. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

- 3.1 EXAMINATION
 - A. Verify that field measurements are as shown on the drawings.
 - B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
 - C. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of drawings and manufacturer's instructions.
 - D. Verify system grounding and bonding is in accordance with Section 260526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
 - E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.
- E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

3.3 FIELD QUALITY CONTROL

A. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.

3.4 CLEANING

A. Repair scratched or marred exterior surfaces to match original factory finish.

SECTION 265100 INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Ballasts and drivers.
- D. Luminaire accessories.

1.2 RELATED REQUIREMENTS

- A. Section 260537 Boxes.
- B. Section 260553 Identification for Electrical Systems: Identification products and requirements.
- C. Section 260923 Lighting Control Devices: Automatic controls for lighting including occupancy sensors.
- D. Section 262726 Wiring Devices: Manual wall switches and wall dimmers.
- E. Section 265600 Exterior Lighting.

1.3 REFERENCE STANDARDS

- A. IESNA LM-63 ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- B. IES LM-79 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.
- C. IES LM-80 Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- D. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA/IESNA 500 Standard for Installing Indoor Commercial Lighting Systems; 2006.
- F. NECA/IESNA 502 Standard for Installing Industrial Lighting Systems; 2006.
- G. NEMA LE 4 Recessed Luminaires, Ceiling Compatibility; 2012.
- H. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 924 Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- K. UL 1598 Luminaires; Current Edition, Including All Revisions.
- L. UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - b. Include IES LM-79 test report upon request.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IESNA LM-63 standard format upon request.
- C. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- D. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting) and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.8 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.
- 1.9 WARRANTY
 - A. Provide five year manufacturer warranty for all LED luminaires, including drivers.
 - B. Provide five year pro-rata warranty for batteries for emergency lighting units.
 - C. Provide ten year pro-rata warranty for batteries for self-powered exit signs.

PART 2 PRODUCTS

- 2.1 LUMINAIRE TYPES
 - A. Furnish products as indicated in luminaire schedule included on the drawings.
- 2.2 LUMINAIRES
 - A. Provide products that comply with requirements of NFPA 70.
 - B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
 - C. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
 - E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.
- 2.3 EXIT SIGNS
 - A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.
 - B. Self-Powered Exit Signs:
 - 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - 2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
 - 3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - 4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
 - 5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.

2.4 BALLASTS AND DRIVERS

- A. Ballasts/Drivers General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to 10 percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - Control Compatibility: Fully compatible with the dimming controls to be installed.
 a. Wall Dimmers: See Section 262726.

2.5 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.
- 3.2 PREPARATION
 - A. Provide extension rings to bring outlet boxes flush with finished surface.
 - B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install products according to manufacturer's instructions.
- D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
 - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
- H. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
 - 3. Install canopies tight to mounting surface.
- I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- J. Install accessories furnished with each luminaire.
- K. Bond products and metal accessories to branch circuit equipment grounding conductor.
- L. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

3.4 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs to verify proper operation upon loss of normal power supply.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.5 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.7 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

SECTION 265600 EXTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior luminaires.
- B. Luminaire accessories.

1.2 RELATED REQUIREMENTS

- A. Section 033000 Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 260526 Grounding and Bonding for Electrical Systems.
- C. Section 260537 Boxes.

1.3 REFERENCE STANDARDS

- A. IEEE C2 National Electrical Safety Code; 2017.
- B. IES LM-79 Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- C. IES LM-80 Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- D. NECA 1 Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA/IESNA 501 Standard for Installing Exterior Lighting Systems; 2006.
- F. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1598 Luminaires; Current Edition, Including All Revisions.
- H. UL 8750 Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.
- 1.4 ADMINISTRATIVE REQUIREMENTS
 - A. Coordination:
 - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
 - 2. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

- A. See Section 013000 Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
 - 2. Provide photometric calculations where luminaires are proposed for substitution.
 - 3. Provide structural calculations for each pole proposed for substitution.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
 - B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

- 2.1 LUMINAIRE TYPES
 - A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.3 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 - 2. Structural Design Criteria:
 - a. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
 - 1) Design Wind Speed: 100 miles per hour, with gust factor of 1.3.
 - 3. Material: Steel, unless otherwise indicated.
 - 4. Shape: Round straight, unless otherwise indicated.
 - 5. Finish: Match luminaire finish, unless otherwise indicated.
 - 6. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
 - 7. Unless otherwise indicated, provide with the following features/accessories:
 - a. Handhole.
 - b. Anchor bolts with leveling nuts or leveling shims.
 - c. Anchor base cover.
- B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

2.4 ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Recessed Luminaires:
 - 1. Install trims tight to mounting surface with no visible light leakage.
 - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
 - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Pole-Mounted Luminaires:

1.

- Maintain the following minimum clearances:
 - a. Comply with IEEE C2.
 - b. Comply with utility company requirements.
- 2. Foundation-Mounted Poles:
 - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
 - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
 - 2) Position conduits to enter pole shaft.
 - b. Install foundations plumb.
 - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
 - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
 - e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
 - f. Install anchor base covers or anchor bolt covers as indicated.
- 3. Grounding:
 - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.

- 4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- H. Install accessories furnished with each luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Install lamps in each luminaire.
- 3.3 FIELD QUALITY CONTROL
 - A. Inspect each product for damage and defects.
 - B. Operate each luminaire after installation and connection to verify proper operation.
 - C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.4 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Luminaires with Field-Rotatable Optics: Position optics according to manufacturer's instructions to achieve lighting distribution as indicated or as directed by Architect.
- 3.5 CLEANING
 - A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.6 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

SECTION 284600 FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Transmitters for communication with supervising station.
- C. Maintenance of fire alarm system under contract for specified warranty period.

1.2 REFERENCE STANDARDS

- A. 36 CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- D. NFPA 70 National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 National Fire Alarm and Signaling Code; 2016.
- F. NFPA 101 Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 268 Standard for Smoke Detectors for Fire Alarm Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 2. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 3. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 4. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 5. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 6. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 7. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
- B. Evidence of installer qualifications.
- C. Evidence of instructor qualifications; training lesson plan outline.
- D. Evidence of maintenance contractor qualifications, if different from installer.
- E. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.
- F. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.

- 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
- 4. List of recommended spare parts, tools, and instruments for testing.
- 5. Replacement parts list with current prices, and source of supply.
- 6. Detailed troubleshooting guide and large scale input/output matrix.
- 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
- 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- G. Closeout Documents:
 - 1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 - 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
 - 3. Maintenance contract.
- H. Post-Contract Maintenance and Repair
 - 1. Include a quote for a maintenance contract to provide all maintenance, required tests, and pricing for any replacement products included on the bill of materials, along with the pricing for products not on the bill of materials; if test and inspection rates are different than full service rates the bid/proposal shall include pricing for all levels for a minimum period of three (3) years Rates and costs shall be valid for the period of five (3) years after expiration of the initial 2-year maintenance contract to be included in this Work.
 - 2. Include also a quote for unscheduled maintenance/repairs, including hourly rates for technicians trained on this equipment, pricing for any replacement products included on the bill of materials, along with the pricing for products not on the bill of materials, and response travel costs for each year of the maintenance period. Submittals that do not identify all post contract maintenance costs will not be accepted. Rates and costs shall be valid for the period of four (4) years after expiration of the warranty.

1.4 QUALITY ASSURANCE

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
 - 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
 - 2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
 - 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
 - 4. Contract maintenance office located within 100 miles of project site.
- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- 1.5 WARRANTY
 - A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fire Alarm Control Units and Accessories Basis of Design: Notifier "Onyx" Series.
- B. Fire Alarm Control Units and Accessories Other Acceptable Manufacturers:
 - 1. Honeywell Security & Fire Solutions/Fire-Lite: www.firelite.com/#sle.
 - 2. Siemens Building Technologies, Inc; ____: www.usa.siemens.com/#sle.
 - 3. Simplex, a brand of Johnson Controls; _____: www.simplex-fire.com/#sle.
 - 4. Provide control units made by the same manufacturer.
- C. Initiating Devices and Notification Appliances:
 - 1. Same manufacturer as control units.
 - 2. Provide initiating devices and notification appliances made by the same manufacturer, where possible.
- D. Substitutions: See Section 016000 Product Requirements.
 - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
 - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.
- 2.2 FIRE ALARM SYSTEM
 - A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
 - 1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
 - 2. Protected Premises: Entire building shown on drawings.
 - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the State Fire Marshal.
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 101.
 - f. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 - 4. Evacuation Alarm: Single smoke zone; general evacuation of entire premises.
 - 5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.
 - 6. Program notification zones and voice messages as directed by Owner.
 - 7. Hearing Impaired Occupants: Provide visible notification devices in all public areas.
 - 8. Fire Command Center: Location indicated on drawings.
 - 9. Fire Alarm Control Unit: New, located at fire command center.
 - 10. Combined Systems: Do not combine fire alarm system with other non-fire systems.
 - B. Supervising Stations and Fire Department Connections:
 - 1. Public Fire Department Notification: By remote supervising station.
 - 2. Remote Supervising Station: UL-listed central station under contract to facility.
 - 3. Means of Transmission to Remote Supervising Station: Digital alarm communicator transmitter (DACT), 2 telephone lines.
 - C. Circuits:
 - 1. Initiating Device Circuits (IDC): Class B, Style A.
 - 2. Signaling Line Circuits (SLC): Class B, Style 0.5.
 - 3. Notification Appliance Circuits (NAC): Class B, Style Y.

- D. Spare Capacity:
 - 1. Initiating Device Circuits: Minimum 25 percent spare capacity.
 - 2. Notification Appliance Circuits: Minimum 50 percent spare capacity.
 - 3. Speaker Amplifiers: Minimum 50 percent spare capacity.
 - 4. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
 - 1. Primary: Dedicated branch circuits of the facility power distribution system.
 - 2. Secondary: Storage batteries.
 - 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.

2.3 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
 - 1. Sprinkler water control valves.
 - 2. Dry-pipe sprinkler system pressure.
 - 3. Dry-pipe sprinkler valve room low temperature.
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Sprinkler water flow.
 - 2. Kitchen hood suppression activation; also disconnect fuel source from cooking equipment.
 - 3. Duct smoke detectors.
 - 4. Activation of manual pull station
 - 5. Area smoke and heat detectors
- C. HVAC:
 - 1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.4 COMPONENTS

- A. General:
 - 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 - 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Speakers, visual units, and combination units are to be furnished with white finish.
- D. Master Control Unit: As specified for Basis of Design above, or equivalent.
- E. Remote Annunciators:
- F. Remote Paging Stations:
- G. Initiating Devices:
 - 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
 - 2. Manual Pull Stations: UL 38 listed, non-coded, addressable, dual-action (push in / pull down) operation with key operated reset lock feature.
 - 3. Smoke Detectors: Analog addressable, 2-wire, photoelectric type, UL 268 listed, 24 V-dc operation, with integral communications.
 - 4. Duct Smoke Detectors: UL 268A listed, installed in listed housing assembly with appropriate sampling tubes.
 - a. Provide with remote keyed test station with indicator light.
 - 5. Heat Detectors: Combination fixed temperature and rate-of-rise.

- 6. Carbon Monoxide Detectors: Addressable, 2-wire, with integral communication, operating at 24V-dc, UL 2075 listed, and with a 10-year cell with end-of-life warning.
 - a. Provide with sounder base to produce distinct audible signal.
- 7. Addressable Interface Devices: _____.
- H. Notification Appliances:
 - 1. Speakers: Dual-voltage transformer speaker, Frequency range of 400 to 4,000 Hz, power taps and voltage selected by rotary switches, UL 1480 listed.
 - 2. Strobes: Xenon strobe light with clear polycarbonate lens mounted on aluminum faceplate, UL 1971 listed. Unit shall have field selectable output of 15, 30, 75, 95, 110 and 115 candela..
- I. Circuit Conductors: Copper; provide 200 feet extra; color code and label.
- J. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- K. Locks and Keys: Deliver keys to Owner.
- L. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 - 2. Provide one for each control unit where operations are to be performed.
 - 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 - 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
 - B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
 - C. Obtain Owner's approval of locations of devices, before installation.
 - D. Install instruction cards and labels.
- 3.2 INSPECTION AND TESTING FOR COMPLETION
 - A. Notify Owner 7 days prior to beginning completion inspections and tests.
 - B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
 - C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
 - D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
 - E. Provide all tools, software, and supplies required to accomplish inspection and testing.
 - F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
 - G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.3 OWNER PERSONNEL INSTRUCTION

- A. Provide the following instruction to designated Owner personnel:
 - 1. Hands-On Instruction: On-site, using operational system.
 - 2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
- B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
 - 1. Initial Training: 1 session pre-closeout.
- C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:

- 1. Initial Training: 1 session pre-closeout.
- D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

3.4 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

3.5 MAINTENANCE

- A. Provide to Owner, at no extra cost, a written maintenance contract for 2 years, to include the work described below.
- B. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
 - 2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 - 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- C. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 2 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- D. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- E. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- F. Comply with Owner's requirements for access to facility and security.

END OF SECTION