



Sunflower County Consolidated School District ESSER 2 and 3 Phase I Indianola, Mississippi

PROJECT MANUAL

Project No. 21027

2 February 2022

100% CONSTRUCTION DOCUMENTS
VOLUME 1 OF 1



DALE | BAILEY
AN ASSOCIATION

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Jackson, Mississippi 39201

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Structural:
Mechanical:
Electrical:

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D|B PN 21027.00

Sunflower County Consolidated School District ESSER 2 & 3,
Phase 1
Indianola, Mississippi
Issue Date: 2 February 2022

PROJECT TEAM LISTING

OWNER



**Sunflower Country
Consolidated School District**

ARCHITECT OF RECORD

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Sunflower County Consolidated School District ESSER 2 & 3,
Phase 1
Indianola, Mississippi
Issue Date: 2 February 2022

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*Architectural drawings and the specification sections
denoted in the Table of Contents with (A)*

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Sunflower County Consolidated School District ESSER 2 & 3,

Phase 1

Indianola, Mississippi

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Sunflower County Consolidated School District ESSER 2 & 3,
Phase 1

Indianola, Mississippi

Issue Date: 2 February 2022

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*Mechanical drawings and the specification sections
denoted in the Table of Contents with (FP, P or M)*

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Sunflower County Consolidated School District ESSER 2 & 3,
Phase 1

Indianola, Mississippi

Issue Date: 2 February 2022

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*Electrical drawings and the specification sections
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DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled Sunflower County Consolidate School District ESSER 2 and 3, dated 2 February 2022, as modified by subsequent Addenda and Contract modifications.
- B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

General

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G-002	Index & General Project
G-001a	General Sheet
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S-141d	Overall Roof Plan Lockard Elementary
S-141f	Overall Roof Plan Ruleville Elementary
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 M-002a Mechanical Roof Plan
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 M-004b Overall Plumbing Plan
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E-400 Electrical Schedules
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E-604 Partial Lighting Plans
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E-701 Electrical Schedules
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E-703 Overall Lighting Plan
Ra101f Context Resource Sheet

END OF DOCUMENT 000115

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DOCUMENT 000820 - FEDERAL REQUIREMENTS

PART 1 - SUMMARY

1.1 GENERAL

1. Sunflower County School District will be using funding available under the Elementary and Secondary School Emergency Relief Fund to fund this project. As a result, specific federal laws, regulations, and requirements may apply in addition to those under state law.
2. All contractors must submit the enclosed certifications regarding their willingness and ability to comply with applicable federal standards:
 - a. Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms
 - b. Domestic preference for procurements
 - c. Contract cost and price
 - d. Bonding requirements
 - e. Equal Employment Opportunity
 - f. Davis-Bacon Act, as amended
 - g. Contract Work Hours and Safety Standards Act
 - h. Rights to Inventions Made Under a Contract or Agreement
 - i. Clean Air Act and the Federal Water Pollution Control Act, as amended
 - j. Debarment and Suspension (Executive Orders 12549 and 12689)
 - k. Byrd Anti-Lobbying Amendment

PART 2 - CONTRACTING WITH SMALL AND MINORITY BUSINESSES, WOMEN'S BUSINESS ENTERPRISES, AND LABOR SURPLUS AREA FIRMS

- 2.1 The non-Federal entity must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.
- 2.2 Affirmative steps must include:
 1. Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 2. Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 3. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
 4. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
 5. Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and

6. Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (b)(1) through (5) of this section.

PART 3 - DOMESTIC PREFERENCE FOR PROCUREMENTS

- 3.1 As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.
- 3.2 For purposes of this section:
 1. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
 2. "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

PART 4 - CONTRACT COST AND PRICE

- 4.1 The non-Federal entity must perform a cost or price analysis in connection with every procurement action in excess of the Simplified Acquisition Threshold including contract modifications. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, the non-Federal entity must make independent estimates before receiving bids or proposals.
- 4.2 The non-Federal entity must negotiate profit as a separate element of the price for each contract in which there is no price competition and, in all cases, where cost analysis is performed. To establish a fair and reasonable profit, consideration must be given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.
- 4.3 Costs or prices based on estimated costs for contracts under the Federal award are allowable only to the extent that costs incurred or cost estimates included in negotiated prices would be

allowable for the non-Federal entity under subpart E of this part. The non-Federal entity may reference its own cost principles that comply with the Federal cost principles.

- 4.4 The cost plus a percentage of cost and percentage of construction cost methods of contracting must not be used.

PART 5 - EQUAL EMPLOYMENT OPPORTUNITY

- 5.1 Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

PART 6 - DAVIS-BACON ACT

- 6.1 Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR 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"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

1. Federal government - The term "Federal Government" has the same meaning that the term "United States" had in the Act of March 3, 1931 (ch. 411, 46 Stat. 1494) (known as the Davis-Bacon Act).²
2. Wages, scale of wages, wage rates, minimum wages, and prevailing wages.- The terms "wages", "scale of wages", "wage rates", "minimum wages", and "prevailing wages" include-
 - a. The basic hourly rate of pay; and

- b. For medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the forgoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying the costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal, state, or local law to provide any of those benefits, the amount of-
- 1) the rate of contribution irrevocably made by a contractor or subcontractor to a trustee or to a third person under a fund, plan, or program; and
 - 2) the rate of costs to the contractor or subcontractor that may be reasonably anticipated in providing benefits to laborers and mechanics pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the laborers and mechanics affected.
3. Rate of wages for laborers and mechanics
- 1) Application.- The advertised specifications for every contract in excess of \$2,000, to which the Federal Government or the District of Columbia is a party, for construction, alteration, or repair, including painting and decorating, of public buildings and public works of the Government or the District of Columbia that are located in a State or the District of Columbia and which requires or involves the employment of mechanics or laborers shall contain a provision stating the minimum wages to be paid various classes of laborers and mechanics.
 - 2) Based on Prevailing Wage. - The minimum wages shall be based on the wages the Secretary of Labor determines to be prevailing for the corresponding classes of laborers and mechanics employed on projects of a character similar to the contract work in the civil subdivision of the State in which the work is to be performed, or in the District of Columbia if the work is to be performed there.
 - 3) Stipulations Required in Contract. - Every contract based upon the specifications referred to in subsection (a) must contain stipulations that-
 - a) The contractor or subcontractor shall pay all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications, regardless of any contractual relationship which may be alleged to exist between the contractor or subcontractor and the laborers and mechanics;
 - b) The contractor will post the scale of wages to be paid in a prominent and easily accessible place at the site of the work; and
 - c) There may be withheld from the contractor so much of accrued payments as the contracting officer considers necessary to pay to laborers and mechanics employed by the contractor or any subcontractor on the work the difference between the rates of wages required by the contract to be paid laborers and mechanics on the work and the rates of wages received by the laborers and mechanics and not refunded to the contractor or subcontractors or their agents.
 - 4) Discharge of Obligation.- The obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the Secretary of Labor, under this subchapter and other laws incorporating this subchapter by reference, may be discharged by making payments in cash, by making contributions described in section 3141(2)(B)(i) of this title, by

assuming an enforceable commitment to bear the costs of a plan or program referred to in section 3141(2)(B)(ii) of this title, or by any combination of payment, contribution, and assumption, where the aggregate of the payments, contributions, and costs is not less than the basic hourly rate of pay plus the amount referred to in section 3141(2)(B) of this title.

- 5) Overtime Pay.- In determining the overtime pay to which a laborer or mechanic is entitled under any federal law, the regular or basic hourly rate of pay (or other alternative rate on which premium rate of overtime compensation is computed) of the laborer or mechanic is deemed to be the rate computed under section 3141(2)(A) of this title, except that where the amount of payments, contributions, or costs incurred with respect to the laborer or mechanic exceeds the applicable prevailing wage, the regular or basic hourly rate of pay (or other alternative rate) is the amount of payments, contributions, or costs actually incurred with respect to the laborer or mechanic minus the greater of the amount of contributions or costs of the types described in section 3141(2)(B) of this title actually incurred with respect to the laborer or mechanic or the amount determined under section 3141(2)(B) of this title but not actually paid.
4. Termination of work on failure to pay agreed wages
 - a. Every contract within the scope of this subchapter shall contain a provision that if the contracting officer finds that any laborer or mechanic employed by the contractor or any subcontractor directly on the site of the work covered by the contract has been or is being paid a rate of wages less than the rate of wages required by the contract to be paid, the Federal Government by written notice to the contractor may terminate the contractor's right to proceed with the work or the part of the work as to which there has been a failure to pay the required wages.
 - b. The Government may have the work completed, by contract or otherwise, and the contractor and the contractor's sureties shall be liable to the Government for any excess costs the Government incurs.
 5. Authority of Comptroller General to pay wages and list contractors violating contracts
 - a. Payment of Wages.
 - 1) The Comptroller General shall pay directly to laborers and mechanics from any accrued payments withheld under the terms of a contract any wages found to be due laborers and mechanics under this subchapter.
 - 2) Right of action. - If the accrued payments withheld under the terms of the contract are insufficient to reimburse all the laborers and mechanics who have not been paid the wages required under this subchapter, the laborers and mechanics have the same right to bring a civil action and intervene against the contractor and the contractor's sureties as is conferred by law on persons furnishing labor or materials. In those proceedings it is not a defense that the laborers and mechanics accepted or agreed to accept less than the required rate of wages or voluntarily made refunds.
 - b. List of Contractors Violating Contracts
 - 1) The Comptroller General shall distribute to all departments of the Federal Government a list of the names of persons whom the Comptroller General has found to have disregarded their obligations to employees and subcontractors.
 - 2) Restriction on awarding contracts. - No contract shall be awarded to persons appearing on the list or to any firm, corporation, partnership, or association in

which the persons have an interest until three years have elapsed from the date of publication of the list.

- 6. This subchapter applies to a contract authorized by law that is made without regard to section 3709 of the Revised Statutes (41 U.S.C. 5), or on a cost-plus-a-fixed-fee basis or otherwise without advertising for proposals, if this subchapter otherwise would apply to the contract.

6.2 WAGE RATES

- 1. Refer to attachment General Decision Number: MS20210045 06/04/2021

PART 7 - CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

- 7.1 Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

PART 8 - RIGHTS TO INVENTIONS MADE UNDER A CONTRACT OR AGREEMENT

- 8.1 If the Federal award meets the definition of “funding agreement” under 37 CFR 401.2(a) and the recipient or subrecipient wished to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that “funding agreement”, the recipient or subrecipient must comply with the requirements of 37 CFR 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements” and any implementing regulations issued by the awarding agency. . These requirements do not apply to the purchase of supplies or materials ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

PART 9 - CLEAN AIR ACT AND THE FEDERAL WATER POLLUTION CONTROL ACT

- 9.1 Contracts and subgrants in excess of \$150,000 must contain a provision that requires the non-Federal award recipient to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C 7401-7671q) and the Federal Water Pollution

Control Act as amended (33 U.S.C 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

PART 10 - DEBARMENT AND SUSPENSION

- 10.1 A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

PART 11 - Byrd Anti-Lobbying Amendment

- 11.1 Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

END OF DOCUMENT 000820

	Rates	Fringes
PLUMBER.....	\$ 27.11	10.57

SUMS2015-007 04/03/2017		

	Rates	Fringes
CARPENTER.....	\$ 18.11	1.69
CEMENT MASON/CONCRETE FINISHER...	\$ 20.00	0.00
ELECTRICIAN.....	\$ 17.03	9.10
LABORER: Common or General.....	\$ 10.00	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.98	0.00
LABORER: Pipelayer.....	\$ 12.52	0.75
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 18.00	0.00
PAINTER (Brush and Roller).....	\$ 15.17	0.00
PIPEFITTER.....	\$ 22.77	6.96
SHEET METAL WORKER, Includes HVAC Duct Installation.....	\$ 21.86	11.18
TRUCK DRIVER: Dump Truck.....	\$ 13.92	1.91

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union, which prevailed in the survey for this classification, which in this example would be Plumbers 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is

based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Division National Office Branch of Wage Surveys. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

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INDEPENDENT CONTRACTOR DEBARMENT VERIFICATION FORM

(Please print clearly or type)

Subgrantee's/Contractor's Name	
Authorized Official's Name	
Complete Address	
Contact Number	
Are you currently registered with www.sam.gov (Yes or No) If yes, attach supporting documentation and DUNS number must be Active with open access. (Federal fund requirement)	
Are you currently registered to do business in the State of Mississippi? (Yes or No) If yes, attach supporting documentation of registration status. If not, please register and provide documentation of registration status. (Federal and State/Other fund requirement)	

***Appropriate signatures shall certify statements below.*

FEDERAL DEBARMENT CERTIFICATION:

CONTRACTOR hereby certify that at the execution of a contract with the Mississippi Department of Education, CONTRACTOR is not on the list for federal debarment on www.sam.gov – System for Award Management.

STATE OF MISSISSIPPI REGISTRATION:

CONTRACTOR hereby certify that at the execution of a contract with the Mississippi Department of Education, CONTRACTOR is not on the list for debarment on www.sos.ms.gov for doing business with the State of Mississippi or with any Mississippi State Agency.

PARTNERSHIP DEBARMENT CERTIFICATION:

CONTRACTOR hereby certify that all entities who are in partnership through this contract or grant with the Mississippi Department of Education (MDE) (subcontractors, subrecipients, et al.) are not on the federal debarment list on www.sam.gov – System for Award Management or the State of Mississippi debarment list. Proof of documentation of partnership verification with SAM shall be kept on file and the debarment status shall be checked prior to submission of every contract/subgrant and modification to MDE.

Original Signature of Contractor or Authorized Official

Date

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DOCUMENT 001113 - ADVERTISEMENT FOR BIDS

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Notice is hereby given that sealed bids will be received for the project named below by the Sunflower County Consolidated School District.
- B. Project Identification: 21027 Sunflower County Consolidated School District ESSER 2 and 3, Phase 1.
1. Project Location:
- Site a: AW James Elementary School, 400 South Blvd, Drew, MS 38737.
 - Site b: Carver Elementary School, 404 Jefferson St, Indianola, MS 38751.
 - Site c: Drew Hunter Middle School, 10 Swoope Rd, Drew, MS 38737.
 - Site d: Lockard Elementary School, 302 College Ave, Indianola, MS 38751.
 - Site e: Robert L Merritt Junior High School, 705 Kinlock Rd, Indianola, MS 38751.
 - Site f: Ruleville Central Elementary School, 410 L F Packer Dr, Ruleville, MS 38771.
 - Site g: Ruleville Middle School, 250 Oscar St, Ruleville, MS 38771.
- C. Owner: Sunflower County Consolidated School District, PO Box 70, Indianola, MS 38751.
1. Owner's Representative: Dr. Miskia Davis, Superintendent, mdavis@sunflower.k12.ms.us, T: 662.887.4919.
- D. Architect: Dale | Bailey Architects, An Association, One Jackson Place, Suite 250, 188 East Capitol Street, Jackson, MS 39201.
- E. Project Description:
1. Project consists of replacement of mechanical systems including finish plumbing as well as repairs to finishes and structure that directly relate to this work at seven (7) school sites throughout Sunflower County. This work will include new ceilings, walls where needed to conceal plumbing, new bathroom fixtures as needed to allow for ADA access, paint, and other Work indicated in the Contract Documents.

1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Bid proposals must be delivered in a sealed envelope marked plainly on the outside of the envelope with the following: "Sunflower County Consolidated School District ESSER 2 and 3, Phase 1; Project number 21027 to be opened 9 March 2022" Envelope shall be addressed to Dr. Miskia Davis, Superintendent, Sunflower Consolidated School District, Hwy 49N, 196 MLK Drive, Indianola, MS 38751.
- B. In addition, the envelope shall list the bidders Company name, Company address and all applicable state and local license and registration numbers of the bidder. Envelopes not so marked are submitted at the risk of the bidder as the Owner and Architect assume no responsibility for the premature opening of any bid envelope by any employee of the Owner or Architect. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. In addition, Electronic bids may be submitted through the website www.dalebaileyplans.com. Electronic bids are not required by the Sunflower County Consolidated School District but offered as another means to submit a bid. Single stipulated sum bids will be received for all work required by the contract documents in accordance with the Instructions to Bidders.
2. Bid Date: March 9, 2022.
3. Bid Time: 2:00 p.m., local time.
4. Location: Sunflower County Consolidated School District.

C. Proposals shall be submitted in duplicate only upon the blank proposal forms provided with the specifications and must be accompanied by Proposal Security in the form of a Certified Check or acceptable Bid Bond in the amount equal to at least five percent (5%) of the Base Bid: such security to be forfeited as liquidated damages, not penalty, by any bidder who fails to carry out the terms of the proposal, execute a contract and post-Performance and Payment Bonds in the form and amount within the time specified. The Bid Bond, if used, shall be payable to the Owner.

D. Bids will be thereafter publicly opened and read aloud.

1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of 5 percent of the bid amount. No bids may be withdrawn for a period of 90 days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.
- B. The owner reserves the right to postpone action and final decision for a period of up to ninety (90) days.

1.4 PREBID MEETING

- A. Prebid Meeting: See Document 002513 "Prebid Meetings."
- B. Prebid Meeting: A Prebid meeting for all bidders will be held at Sunflower County Consolidated School District on February 17, 2022, at 10:00 a.m., local time. Prospective prime bidders are requested to attend.
 1. Bidders' Questions: Architect will provide responses at Prebid conference to bidders' questions received up to two business days prior to conference.

1.5 DOCUMENTS

- A. Printed Procurement and Contracting Documents: Obtain after February 2, 2022, by registering at www.dalebaileyplans.com.
- B. Viewing Procurement and Contracting Documents: Examine after February 2, 2022, at the locations below:
 1. Bid documents are being made available via original paper copy or digital CD. Plan holders are required to register and order bid documents at www.dalebaileyplans.com. Bid documents are non-refundable and must be purchased through the website. All plan holders are required to have a valid email address for registration. Questions regarding

website registration and online orders please contact Plan House Printing, 607 W. Main Street Tupelo MS 38804, (662) 407-0193.

1.6 TIME OF COMPLETION AND LIQUIDATED DAMAGES

- A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work by Substantial Completion July 15, 2023. Work is subject to liquidated damages.

1.7 BIDDER'S QUALIFICATIONS

- A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

1.8 NOTIFICATION

- A. This Advertisement for Bids document is issued by Dale | Bailey, an Association.

- B. Advertisement dates are:

Bolivar-Bullet

Wednesday, February 2, 2022

Wednesday, February 9, 2022

Enterprise-Tocsin

Thursday, February 3, 2022

Friday, February 10, 2022

- C. Contact regarding questions, email: biddinginfo@dalepartners.com.

END OF DOCUMENT 001113

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DOCUMENT 002113 - INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Interpretations: Should a bidder find discrepancies in or omissions from the plans and specifications or be in doubt as to their written meaning, he should immediately notify the Architect in writing. The Architect will then send a written instruction or interpretations to all known holders of the documents if deemed appropriate by the Architect. Neither the Owner nor the Architect will be responsible for nor bound by any oral instructions or for a bidder's failure to make inquiry.
- B. Contractor/Subcontractor Question/Answer Period: It is noted that questions will be received and answered on an unofficial basis. Binding answers to questions must be included in an official written addendum and the Contractor or Subcontractor is encouraged to provide written communications to the Architect for proper response. Address e-mailed written correspondence to bidninginfo@dalepartners.com.
- C. Addenda: Any addenda to the plans and / or specifications issued before or during the time of bidding will become a part of the Contract and receipt of same must be acknowledged by Bidder in his proposal.
- D. "Or Equal" Substitutions: Refer to General Conditions 3.2.2 and Section 016000- "Or Equal" Substitutions: Bidder is advised that some sections of the specifications may not allow for substitutions and that the requirements of the General Conditions and Section 016000 and any requirements in the technical specifications which do not conflict with and which are in addition to the General Conditions and Section 016000 may, in the Owner's sole discretion, result in the rejection of the request for "or equal" substitution.

1.2 BIDDING

- A. A Contract for Construction: lump sum, single bid, received from General Contractors and shall include General, Mechanical, Electrical, and Site work as well as all other work shown on plans and specified herein.
- B. Subcontractors and Suppliers: The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a Subcontract or purchase order under this contract must be acceptable to the Owner.
 - 1. The Owner may make such investigation as he deems necessary to determine the ability of the Bidder of subcontractors or suppliers 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 within the time required.
 - 2. All subcontractors must have a current, valid, Contractor's License and/or Certificate of Responsibility where Bid exceeds \$50,000.00.
 - 3. Listing of Subcontractors and Suppliers:

- a. So that the Owner may be assured that only qualified and competent subcontractors and suppliers will be utilized on the project and to prevent “bid-shopping” and/or “bid-chopping”, each Bidder shall identify within seven (7) days after Bid receipt date the name of the subcontractor and supplier used by the Bidder in his bid for each subcontractor and supplier whose bid or quote exceeds \$50,000.00. Bidder’s List shall be provided on the Listing Form provided with the Proposal Form. A Bidder’s failure to indicate the name(s) of the subcontractors and major suppliers included in his lump sum price within seven (7) days after Bid receipt may result in the rejection of the Bidder’s bid as non-responsive.
- b. The successful Bidder shall use the subcontractor and supplier identified by him as being include in his lump sum price, provide however, the Bidder assumes the risk that the subcontractor or supplier listed within seven (7) days after Bid receipt may result in the rejection of the Bidder’s bid as non-responsive.
- c. If Bidder lists itself as a supplier for any of the classifications listed, then the Bidder will be required to furnish such product from its manufacturing inventory and to demonstrate to the Owner and Architect that it has satisfactory qualifications and prior experience manufacturing and furnishing such materials, equipment and/or products. If Bidder lists itself as a subcontractor for any of the classifications listed, then the Bidder will be required to perform the work with its own regularly employed personnel and to demonstrate to the Owner and Architect that is has satisfactory qualifications and prior experience performing such work with its own regularly employed personnel. The Owner reserves the right to reject any bid if the evidence submitted by Bidder fails to satisfy the Owner that the Bidder has satisfactory qualifications and prior experience performing such work and/or furnishing such materials, equipment and /or products.

1.3 NON-COLLUSIVE AFFIDAVITT

- A. Bids shall be accompanied with 004105 Form of Non-Collusive Affidavit. Form is provided in Division 1 of the project manual.

1.4 CERTIFICATE OF RESPONSIBILITY

- A. Each bidder submitting a bid equal to or in excess of \$50,000.00 on public projects and equal to or in excess of \$100,000.00 on private projects must show on his bid and on the face of the envelope containing the bid, his Certificate of Responsibility Number, as required by Section 31-3-21 (latest revision) Mississippi Code. If the bid does not exceed \$50,000.00 on public projects and \$100,000.00 on private projects, a notation so stating must appear on the face of the envelope.
- B. Each subcontractor shall also have a Certificate of Responsibility Number, as required by Section 31-3-21 (latest revision), Mississippi Code.
- C. Evidence: No bid will be opened, considered or accepted unless the above information is given as specified. Sufficient evidence that said Certificate of Responsibility has been issued and is in effect at the time of receiving bids must be submitted if required by the Owner or the Architect. Likewise, it shall be the responsibility of the General Contractor to require a Certificate of Responsibility Number from any subcontractor that falls in the category of “B” above.
- D. In accordance with Mississippi law, if the Bidder is a joint venture, either the joint venture or all of the Contractors which make up the joint venture must hold certificates of responsibility from the State Board of Contractors.

1.5 BID BOND

- A. Use AIA Document A310, Bid Bond, 2010 Edition for execution of Bid Bond.

1.6 BID SECURITY

- A. Each bid, exceeding \$5,000.00 must be accompanied by the Bidder's certified check or a bid bond, duly executed by the Bidder as principal and having surety thereon, a surety company approved by the Owner and signed by an agent resident in Mississippi, in the amount of five percent of the bid. All bid bonds must be accompanied by the appropriate Power of Attorney designating the Mississippi Resident Agent.

1.7 OPENING OF PROPOSALS

- A. Refer to the Advertisement of Bid.

1.8 PREPARATION OF BID

- A. Conditions of Work: Each Bidder must fully inform himself of the conditions relating to the construction of the project and employment of labor thereon. Failure to do so will not relieve a successful Bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his Contract. The Contractor must employ methods or means to cause no interruptions of or interference with the work of any other Contractor.
- B. Examination of Site: All bidders, including the general contractor and subcontractors, will visit the site of the building, and inform themselves of all conditions. Failure to visit the site will in no way relieve the successful Bidder from his obligation to complete all work in accordance with the Contract Documents without additional cost to the Owner.
- C. Staging and Access: All Bidders, including the general contractor and subcontractors, acknowledge that the construction premises are restricted and that access is affected by the location of the project, by the facilities surrounding the project and by other construction either presently being performed or proposed to be performed during the performance of this Contract. All Bidders, including the general contractor and subcontractors, further acknowledge that such limitations in space and accessibility have been taken into account in estimating their bids.
- D. Laws and Regulations: 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 apply to the Contract. The successful Bidder shall be required to comply with all applicable laws, ordinances, rules and regulations at no additional adopted or become effective before or after bid opening.
- E. Obligation of Bidder: At the time of opening of bids, Bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the plans and specifications, including all addenda.
- F. Telegraphic and Facsimile Modifications: A Bidder may modify his bid by telegraphic or facsimile communication at any time, provided such communication is received by the Owner prior to the scheduled time for opening time or no consideration will be given the telegraphic or facsimile modifications.

1.9 PROPOSALS

- A. Form: Submit all proposals on forms provided and fill all applicable blank spaces without interlineations, alterations, or erasure and recapitulations of the work to be done. No oral, telegraphic, or telephonic proposals will be considered. Any addenda issued during the bidding must be noted on the Proposal Form.
- B. Withdrawal: Any bid may be withdrawn prior to the time for opening of bids or authorized postponement thereof. Any bid received after the time and date specified will not be considered. All bids are irrevocable offers to contract at the price bid which may not be withdrawn until Ninety (90) days after bid opening.
- C. Submittal: Submit bids in duplicate in an opaque sealed envelope bearing on the outside, the name and Certificate of Responsibility number of the Bidder, his address, bid opening date, and time.
- D. Any bid modification or qualification on the outside of the envelope will be considered only if accompanied by signature and title of person making the modification.
- E. Mailing: If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to: Dr. Miskia Davis, Superintendent, Sunflower County Consolidated School District, P.O. Box 70, Indianola, Mississippi 38751.
- F. Ground Service: Sunflower County Consolidated School District, 196 Martin Luther King Dr N, Indianola, MS 38751.
- G. Bidders are urged to deliver their bid to the Owner. Owner will not be responsible for misdelivery of mail or express deliveries.

1.10 CONTRACT

- A. Award of Contract: Award shall be made to the lowest and best Bidder, pursuant to Mississippi law and these Instructions to Bidders. The lowest bid shall be the base bid or combination of base bid and those alternates which produce a total within available funds. The Owner reserves the right to waive irregularities and to reject any and all bids.
- B. Disqualification of Bidder: The Owner reserves the right to award to other than the low Bidder when, in the Owner's judgment, it is in his best interest to do so. For instance, a Bidder may be disqualified for such reasons as:
 - 1. Bidder being in arrears on existing contracts.
 - 2. Bidder being in litigation with the Owner or the institution/agency.
 - 3. Bidder having defaulted on or failed to satisfactorily complete a previous contract with the Owner, including Bidder's failure to satisfactorily fulfill the warranty obligations of a previous contract with the Owner.
- C. The above is not an inclusive list.
- D. Security for Faithful Performance: When the bid exceeds \$4,000.00 and simultaneously with his delivery of the executed Contract, the Contractor will furnish a payment and a performance bond in accordance with Section 31-5-51 et. Seq. of the Mississippi Code (latest revision). The surety on such bonds will be a duly authorized surety company licensed to do business in the

state of Mississippi which is acceptable to the owner and which is listed on the United States' Treasury Department's list of acceptable sureties.

- E. Time of Completion: By submission of its bid, Bidder agrees to commence work on or before a date specified in a written "Notice to Proceed" and fully complete the project within the time stated in the Bid Proposal Form.
- F. Substantial Completion: By completion of the project shall be as defined by Section 9.8.1 of the General Conditions "... when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the work for its intended use."
- G. Final Acceptance/Completion: Final acceptance/completion of the project as defined in the General Conditions 9.10.2.1 requires the submittal by Contractor of all closeout documents, all ownership and maintenance manuals required by the technical sections of the Contract the Guarantee of Work required by the General Conditions 12.2.2.5 and 12.2.2.6 and the manufacturer's certifications. Bidder's attention is specifically directed to the General Conditions 9.8.4 for additional conditions precedent to final acceptance/completion of the project.
- H. Liquidated Damages for Failure to Enter Into Contract: The successful Bidder, upon his failure or refusal to execute and deliver the Contract and required bonds within ten days after he has received notice of the acceptance of his bid, will forfeit to the Owner as liquidated damages the security deposited with his bid.
- I. Liquidated Damages for Failure to Substantially Complete Project in Time Stipulated: Applicable when stipulated sum is shown in General Conditions 9.11.

1.11 BID DOCUMENTS

- A. Plans and specifications are available, unless noted otherwise on the Advertisement for Bid, at Dale Bailey's online planroom at www.dalebaileyplans.com.
- B. No partial sets of documents will be issued or accepted for return.

END OF DOCUMENT 002113

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DOCUMENT 002513 - PREBID MEETINGS

1.1 PREBID MEETING

- A. Architect will conduct a Prebid meeting as indicated below:
1. Meeting Date: 17 February 2022 .
 2. Meeting Time: 10:00 AM , local time.
 3. Location: Sunflower Consolidated District Office , 196 Martin Luther King Dr. N , Indianola, MS 38751 .
- B. Attendance:
1. Prime Bidders: Attendance at Prebid meeting is recommended .
 2. Subcontractors: Attendance at Prebid meeting is recommended.
 3. Notice: Bids will only be accepted from prime bidders represented on Prebid Meeting sign-in sheet.
- C. Bidder Questions: Submit written questions to be addressed at Prebid meeting minimum of two business days prior to meeting.
- D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:
1. Procurement and Contracting Requirements:
 - a. Advertisement for Bids.
 - b. Instructions to Bidders.
 - c. Bidder Qualifications.
 - d. Bonding.
 - e. Insurance.
 - f. Bid Security.
 - g. Bid Form and Attachments.
 - h. Bid Submittal Requirements.
 - i. Bid Submittal Checklist.
 - j. Notice of Award.
 2. Communication during Bidding Period:
 - a. Obtaining documents.
 - b. Access to Project Web site.
 - c. Bidder's Requests for Information.
 - d. Bidder's Substitution Request/Prior Approval Request.
 - e. Addenda.
 3. Contracting Requirements:
 - a. Agreement.
 - b. The General Conditions.
 - c. The Supplementary Conditions.
 - d. Other Owner requirements.
 4. Construction Documents:
 - a. Scopes of Work.
 - b. Temporary Facilities.
 - c. Use of Site.
 - d. Work Restrictions.
 - e. Alternates, Allowances, and Unit Prices.
 - f. Substitutions following award.

5. Separate Contracts:
 - a. Work by Owner.
 - b. Work of Other Contracts.
 6. Schedule:
 - a. Project Schedule.
 - b. Contract Time.
 - c. Liquidated Damages.
 - d. Other Bidder Questions.
 7. Site/facility visit or walkthrough.
 8. Post-Meeting Addendum.
- E. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.
1. Sign-in Sheet: Minutes will include list of meeting attendees.
 2. List of Planholders: Minutes will include list of planholders.

END OF DOCUMENT 002513

DOCUMENT 003119 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Survey information that includes information on existing conditions, prepared by Lake Baird of Gardener Engineering, PA, dated March 4th, 2020, is available for viewing as part of Drawings.
- C. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to bidders.
 - 3. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 003119

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DOCUMENT 003126 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. An existing asbestos report for Sunflower Consolidated School District projects, prepared by The Pickering Firm, Inc., dated 3 December 2021, is available for viewing as part of the Project Manual .
- C. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.
 - 3. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.

END OF DOCUMENT 003126

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DOCUMENT 004105 – FORM OF NON-COLLUSION AFFIDAVIT

PART 1 - SUMMARY

1.1 GENERAL

1. A copy of the Non-Collusion Affidavit is attached to the end of this Section. It will be the General Contractor's (Bidders) responsibility to complete this form in its entirety and submit it with and in his bid package.
2. This Non-Collusion Affidavit must be executed by the member, officer or employee of the vendor who makes the final decision on prices and the amount bid in the bid.
3. Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the vendor with responsibilities for the preparation, approval or submissions of the bid.
4. In the case of a Bid submitted by a joint venture, each party to the venture must be identified in the Bid documents, and an affidavit must be submitted separately on behalf of each party.
5. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF DOCUMENT 004105

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**NON-COLLUSION AFFIDAVIT
(MUST BE EXECUTED & RETURNED WITH PROPOSAL)**

State of Mississippi

County of _____

I state that I am _____ of _____
(Title) (Name of Company)

and that I am authorized to make this affidavit on behalf of my company, and its owners, directors, and officers, I am the person responsible in my company for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this Bid have been arrived at independently and without consultation, communication or agreement with any other contractor, participating vendor or potential vendor.

(2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor the approximate amount of this bid, have been disclosed to any other company or person who is a submitting a Bid or potential vendor and they will not be disclosed before the Bid opening.

(3) No attempt has been made or will be made to induce any company or person to refrain from submitting a bid.

(4) The Bid of my company is made in good faith and not pursuant to any agreement or discussion with or inducement from, any company or person to submit a complementary or other noncompetitive bid.

(5) _____, its affiliates, subsidiaries,
(Name of Company)
officers, directors and employees are not currently under investigation by any governmental agency and have not in the last four years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to quoting on any public contract, except as follows:

I state that _____ understands and acknowledges
(Name of Company)

that the above representations are material and important and will be relied on by the **Sunflower County Consolidated School District** when recommending for award the contract(s) for which this Bid is submitted, I understand and my company understands that any misstatement in this affidavit is and shall

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be treated as fraudulent concealment from the **Sunflower County Consolidated School District** of the true facts relating to the submission of bids for this contract.

(Print Name of Authorized Person and Company Position)

Signature of Authorized Person

Sworn to and subscribed before me this _____ day of _____, 20____

My commission expires _____
Notary Public

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DOCUMENT 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Sunflower Consolidated School District ESSER 2&3 Phase I .
- C. Project Location:
 - 1. Site a: AW James Elementary School, 400 South Blvd, Drew, MS 38737
 - 2. Site b: Carver Elementary School, 404 Jefferson St, Indianola, MS 38751
 - 3. Site c: Drew Hunter Middle School, 10 Swoope Rd, Drew, MS 38737
 - 4. Site d: Lockard Elementary School, 302 College Ave, Indianola, MS 38751
 - 5. Site e: Robert L Merritt Junior High School, 705 Kinlock Rd, Indianola, MS 38751
 - 6. Site f: Ruleville Central Elementary School, 410 L F Packer Dr, Ruleville, MS 38771
 - 7. Site g: Ruleville Middle School, 250 Oscar St, Ruleville, MS 38771
- D. Owner: Sunflower Consolidated School District, PO Box 70, Indianola, Mississippi.
- E. Owner Project Number: 21027.
- F. Architect: Dale | Bailey, an Association, One Jackson Place, Suite 250, 188 East Capitol Street, Jackson, MS 39201.
- G. Architect Project Number: 21027.

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Dale | Bailey, an Association and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:
 - 1. Base Bid. _____
 Dollars (\$ _____) *Davis Bacon Wages are required in Base Bid.*

1.3 **ALLOWANCES.** Include the allowances below in the base bid. Refer to section 012100-ALLOWANCES

- A. Allowance No. 01: Lump Sum Contingency Allowance for AW James Elementary. Seventy-Five Thousand Dollars (\$75,000.00).
- B. Allowance No. 02: Lump Sum Contingency Allowance. Allowance for Carver Elementary. One Hundred Eighty-Five Thousand Dollars (\$185,000.00).

- C. Allowance No. 03: Lump Sum Contingency Allowance. Allowance for Drew Hunter Middle School. One Hundred Thirty-Five Thousand Dollars (\$135,000.00).
- D. Allowance No. 04: Lump Sum Contingency Allowance. Allowance for Lockard Elementary. One Hundred Eighty-Five Thousand Dollars (\$185,000.00).
- E. Allowance No. 05: Lump Sum Contingency Allowance. Allowance for Merritt Middle School. One Hundred Thirty-Five Thousand Dollars (\$135,000.00).
- F. Allowance No. 06: Lump Sum Contingency Allowance. Allowance for Ruleville Elementary School. Eighty Thousand Dollars (\$80,000.00).
- G. Allowance No. 07: Lump Sum Contingency Allowance. Allowance for Ruleville Middle School. Ninety-Five Thousand Dollars (\$95,000.00).
- H. Allowance No. 08: Hardware Allowance for Alternate No. 1 Ruleville Elementary Multi-Purpose Building New Construction. Twelve (\$12,000.00).

1.4 UNIT RATES. Refer to Section 012200 - Unit Prices for description of unit Prices.

- A. Unit Price 01: Provide a price to prep, prime, & paint tile wainscot
\$ _____ / Sq Ft.

1.5 ALTERNATES. Refer to Section 012300 - Alternates for description of Alternates.

- A. Additive Alternate no. 01: Ruleville Elementary School Multi-Purpose Building New Construction.

_____ Dollars
(\$ _____).

- B. Additive Alternate no. 02: Ruleville Elementary Window Replacement.

_____ Dollars
(\$ _____).

- C. Additive Alternate no. 03: Lockard Elementary Window Replacement.

_____ Dollars
(\$ _____).

- D. Additive Alternate no. 04: All Sites – Remove All Radiant Heaters & Repair Finishes.

_____ Dollars
(\$ _____).

- E. Additive Alternate no. 05: All Sites – Remove All Remaining & Discontinued Heating System Piping.

_____ Dollars

(\$ _____).

1.6 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 . days after a written Notice of Award, if offered within 90 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars

(\$ _____).

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.7 SUBCONTRACTORS AND SUPPLIERS

- A. The following companies shall execute subcontracts for the portions of the Work indicated:

PLUMBING CONTRACTOR - Indicate: Non-DBE Firm, MBE Firm or WBE Firm

Name: _____ License Number: _____

HVAC CONTRACTOR - Indicate: Non-DBE Firm, MBE Firm or WBE Firm

Name: _____ License Number: _____

ELECTRICAL CONTRACTOR - Indicate: Non-DBE Firm, MBE Firm or WBE Firm

Name: _____ License Number: _____

(OTHER CONTRACTOR) - Indicate: Non-DBE Firm, MBE Firm or WBE Firm

Name: _____ License Number: _____

(OTHER CONTRACTOR) - Indicate: Non-DBE Firm, MBE Firm or WBE Firm

Name: _____ License Number: _____

1.8 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents upon receivership of an executed contract between Owner and Contractor, and shall fully complete the Work by July 15, 2023.

1.9 ACKNOWLEDGMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

- 1. Addendum No. 1, dated _____.
- 2. Addendum No. 2, dated _____.
- 3. Addendum No. 3, dated _____.
- 4. Addendum No. 4, dated _____.

1.10 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto.

- 1. Bid Form Supplement - Alternates.
- 2. Bid Form Supplement - Unit Prices.
- 3. Bid Form Supplement - Allowances.
- 4. Bid Form Supplement - Bid Bond Form (AIA Document A310-2010).

1.11 CONTRACTOR'S LICENSE

- A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in Mississippi, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.12 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2022 .
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witnessed By: _____ (Handwritten signature).

- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. License No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal Here).

END OF DOCUMENT 004113

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SECTION 006000 - PROJECT FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
1. AIA Document A101-2017 "Standard Form of Agreement between Owner and Contractor Where the Basis of Payment is a Stipulated Sum."
 - a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."
 2. AIA Document A101- 2017 Exhibit A "Insurance and Bonds."
 3. The General Conditions are included in the Project Manual.
 4. The Supplementary Conditions for Project are incorporated into a modified copy of the General Conditions included in the Project Manual.
 5. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; www.aiacontractdocsaicontracts.org; (800) 942-7732.
- C. Preconstruction Forms:
1. Form of Performance Bond and Labor and Material Bond: AIA Document A312-2010 "Performance Bond and Payment Bond."
 2. Form of Certificate of Insurance: AIA Document G715-2017 "Supplemental Attachment for ACORD Certificate of Insurance 25."
- D. Information and Modification Forms:
1. Form for Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
 2. Form of Request for Proposal: AIA Document G709-2018 "Proposal Request."
 3. Change Order Form: AIA Document G701-2017 "Change Order."
 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-2017 "Architect's Supplemental Instructions."
 5. Form of Change Directive: AIA Document G714-2017 "Construction Change Directive."
- E. Payment Forms:
1. Schedule of Values Form: AIA Document G703-1992 "Continuation Sheet."
 2. Payment Application: AIA Document G702-1992/703-1992 "Application and Certificate for Payment and Continuation Sheet."
 3. Form of Contractor's Affidavit: AIA Document G706-1994 "Contractor's Affidavit of Payment of Debts and Claims."
 4. Form of Affidavit of Release of Liens: AIA Document G706A-1994 "Contractor's Affidavit of Payment of Release of Liens."

5. Form of Consent of Surety: AIA Document G707-1994 "Consent of Surety to Final Payment."

END OF DOCUMENT 006000

DRAFT AIA® Document A101® - 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the «TBD» day of «TBD» in the year « Two Thousand Twenty-Two »

(In words, indicate day, month and year.)

BETWEEN the Owner:

(Name, legal status, address and other information)

« Dr. Miskia Davis, »«Superintendent»
« Sunflower County Consolidated School District »
« PO Box 70
Indianola, MS 38751 »
« »

and the Contractor:

(Name, legal status, address and other information)

« TBD »« »
« »
« »
« »

for the following Project:

(Name, location and detailed description)

«21027 Sunflower County Consolidated School District ESSER 2 & 3»
« »
« »

The Architect:

(Name, legal status, address and other information)

«Dale | Bailey, An Association»
«One Jackson Place, Suite 250
188 East Capitol Street
Jackson, MS 39201-2100»
«Telephone Number: 601-352-5411»

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

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

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

The parties should complete A101®-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

§ 1.1 The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), all sections of the Project Manual, including Drawings, Specifications, and Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all as amended and all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9. Contract Documents also include the Advertisement for Bid and Instructions to Bidders.

§ 1.2 This Agreement, as amended, represents the entire and integrated agreement between the Owner and the Contractor and supersedes all prior negotiations, representations or agreements, either written or oral. In the event of conflict, terms and conditions contained in the Agreement, as amended, shall take precedence over terms and conditions contained in the General Conditions, as amended, and the terms and conditions in the General Conditions, as amended, shall take precedence over all other terms and conditions contained in the other Contract Documents. The Advertisement for Bid and Instructions to Bidders shall take precedence over the Contractor's bid or proposal, unless specifically agreed otherwise herein.

§ 1.3 The Sunflower County Consolidated School District board of trustees (the "School Board"), by a majority vote, is the only representative of the Owner, an independent school district, having the power and authority to enter into or amend this Agreement, to approve and execute a Change Order or Construction Change Directive modifying the Contract Sum, or to agree to an extension to the date of Substantial or Final Completion. The Owner designates the following as the individual authorized to sign documents on behalf of the School Board: Dr. Miskia Davis, Superintendent, or her successor.

§ 1.4 The School Board designates the authorized representatives identified in Paragraph 8.2 to act on its behalf in all other respects.

ARTICLE 2 THE WORK OF THIS CONTRACT

§ 2.1 The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

§ 2.2 Contractor shall, at its own expense as part of the Contract Sum, secure all licenses, furnish all labor, material, plant, office space, tools, equipment, machinery, scaffolding, cartage, electric current for power purposes

and provide all other things and personnel necessary for the full and diligent prosecution of the Work, all in compliance with applicable statutes, building codes, ordinances and regulations and in a first class workmanlike manner in strict accordance with the requirements of the Project as well as the directions of the Project Architect and to the reasonable satisfaction of the Owner. Contractor shall be responsible for supervision, coordination of its sub-trades, and for the performance of all actions reasonably required to complete the Work even if not specifically shown in the plans and specifications but can be reasonably inferred.

§ 2.3 The Contractor is required to furnish a payment and performance bond. Such bonds shall be executed by it with a fidelity or surety company authorized to transact business in Mississippi in form and amount satisfactory to the Owner. The Performance Bond shall guarantee the faithful performance of all contract obligations of this Contract. The Payment Bond shall comply with the requirements of Mississippi regarding unconditional payment bonds and assure the prompt payment of all claims of lienors and laborers. The cost of the bond shall be included within the Contract Sum.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

The date of this Agreement.

A date set forth in a notice to proceed issued by the Owner.

Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

Not later than () calendar days from the date of commencement of the Work.

By the following date: **Substantially Complete July 15, 2023**

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work

Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

§ 3.4 **Liquidated Damages.** Time is of the essence and a material consideration of the Contract. The Contractor acknowledges and recognizes that the Owner is entitled to full and beneficial occupancy and use of the completed Work following expiration of the Contract Time. The Contractor further acknowledges and agrees that if the Contractor fails to complete substantially or cause the Substantial Completion of any portion of the Work in either of the specified phases within the Contract Time, the Owner will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, the

Owner and the Contractor agree to liquidated damages as set forth below in this Paragraph 3.4. The term substantial completion is as defined in Article 9.8.1 of the General Conditions.

§ 3.4.1 Subject to the requirements of Article 8.3 of the General Conditions, if the Contractor fails to achieve Substantial Completion of the Work within the Contract Time, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the per diem amount of **Five Hundred Dollars (\$500.00)** upon the first day following expiration of the Contract Time and continuing until the actual Date of Substantial Completion.

§ 3.4.2 These Liquidated Damages are agreed to be a good faith and reasonable pre-estimate of the Owner's actual damages and are not considered to be a penalty. Contractor and Owner hereby acknowledge and agree that Owner's right to Liquidated Damages hereunder is not intended to be exclusive of any other right, power, or remedy of Owner hereunder or under any other Contract Documents for other defaults by Contractor (i.e., defaults not arising under this Subsection 3.4), but each and every such right, power and remedy shall be cumulative and concurrent and shall be in addition to the right to Liquidated Damages provided for in this Paragraph 3.4.

§ 3.4.3 The Owner may deduct liquidated damages described in this Paragraph 3.4 from any unpaid amounts then or thereafter due the Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at a rate equal to the highest lawful rate of interest payable by the Contractor.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be «TBD » (\$ « »), subject to additions and deductions as provided in the Contract Documents. The Contract Sum is detailed on the Initial Schedule of Values attached as Exhibit _____. To the extent the Cost of the Work exceeds the Contract Sum, the Contractor shall bear such costs in excess of the Contract Sum without reimbursement or additional compensation from the Owner.

§ 4.1.1 The Contract Sum contains an Owner's Contingency in the amount of _____ Dollars (\$_____.00). This contingency is for the sole use of the Owner to be used for changes in the scope of Work, if any, or for the betterment of the Project. Owner's authorized representative may approve any expenditure from Owner's Contingency without further School Board approval. If the Owner's Contingency is not expended or not fully expended, then any unused portion shall belong to the Owner and shall be credited to the Owner in calculating final payment.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
«Additive Alternate No. 1 – Ruleville Elementary Multi-Purpose Building New Construction	
Additive Alternate No. 2 – Rule Elementary Windows	
Additive Alternate No. 3 – Lockard Windows	
Additive Alternate No. 4 – Remove All Radiant Heaters & Repair Finishes	
Additive Alternate No. 5 – Remove All Remaining & Discontinued Heating System »	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
« »		

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
« <u>Allowance No. 1</u> Lump Sum Contingency Allowance for AW James Elementary.	\$75,000.00
<u>Allowance No. 2</u> Lump Sum Contingency Allowance for Carver Elementary.	\$185,000.00
<u>Allowance No. 3</u> Lump Sum Contingency for Drew Hunter Middle School.	\$135,000.00
<u>Allowance No. 4</u> Lump Sum Contingency for Lockard Elementary.	\$185,000.00
<u>Allowance No. 5</u> Lump Sum Contingency for Merritt Middle School.	\$135,000.00
<u>Allowance No. 6</u> Lump Sum Contingency for Ruleville Elementary School.	\$80,000.00
<u>Allowance No. 7</u> Lump Sum Contingency Allowance for Ruleville Middle School.	\$95,000.00
<u>Allowance No. 8</u> Hardware Allowance for Alternate No. 1 Ruleville Elementary Multi-Purpose Building New Construction»	\$12,000.00

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
« Provide a price to prep, prime & paint wainscot.»	square foot	

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

«\$500.00/day »

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month. The Contractor shall submit monthly Applications for Payment for approval to both the Architect and Owner on AIA Form G702, or such other form agreed to in writing by Owner and Contractor. Continuation sheets shall be submitted on AIA Form G703. If the Architect and Owner approve the application, then the Architect shall

submit a Certificate for Payment to the Owner. The Architect and Owner may require any additional information deemed necessary and appropriate to substantiate the Application for Payment. Materials that are verified to be on the jobsite or other approved location for use in the Project may also be incorporated into the Application for Payment.

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the «10th» day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the «23rd» day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than «sixty» («60») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.
- .6 If Owner is entitled to deduct liquidated damages, or any other damages or amounts provided in the Contract Documents, including clean-up fees, then Owner shall be entitled to deduct such liquidated damages, amounts and fees at any time.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« »

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

«The Owner will retain five percent (5%) of the amount due to Contractor on account of progress payments until the work is at least fifty percent (50%) complete, on schedule, and satisfactory in the Architect's opinion, at which time the Owner may in its discretion release fifty percent (50%) of the retainage held to date for distribution to the appropriate subcontractors and suppliers, provided that future retainage shall be withheld at the rate of two and one-half percent (2 ½ %). »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

« »

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

« »

§ 5.3 Payment Procedures

§ 5.3.1. Subject to the provisions of Article 9 of the General Conditions, the following payment procedures shall also apply to both progress and final payments.

1. At the time of the submission of an Application for Payment the Contractor shall furnish to the Architect: (1) a certification of work performed on a form approved by the Owner; (2) waivers of lien for all work done by Contractor, all lienors giving notice and any such other persons, firms or corporations performing work in accordance with the Contract Documents to the date of the application for payment; and (3) evidence of payment to all laborers working directly or indirectly for the Contractor through the date of the application for payment. The Owner shall have the right at any time and in its sole discretion to make payments directly to laborers and/or material men and/or sub-contractors of the Contractor, or to make any such payments jointly to such payees and the Contractor.

2. Payments made to the Contractor are received by it in trust to be applied first to the amount owing to any person who has performed labor or furnished materials to the Contractor for the performance and

work under this agreement and before the Contractor shall use any monies received for any other purposes.

3 Partial or final payment will not be payable or due at the option of the Owner in the event that any of the following conditions exist: (1) Defective or damaged work is not remedied by Contractor; (2) Claims have been filed by laborers, material men and/or subcontractors under this agreement; (3) Contractor fails to make the proper application for payment or fails to comply with Mississippi's mechanics lien law; (4) Contractor becomes bankrupt or insolvent; (5) This agreement or any other agreement between Owner and Contractor is in breach; and (6) Any insurance required of Contractor ceases to be effective and in force.

4.. Acceptance of final payment by Contractor operates as a release to the Owner of all claims and liability to the Contractor for all construction work performed by Contractor.

§ 5.3.2 The compensation payable to the Contractor hereunder shall not be increased because of the imposition of any taxes, or of increases in the price of any labor, material or services.

§ 5.3.3 No payment made hereunder shall operate as an admission on the part of the Owner that this Agreement, or any part thereof has been complied with, or preclude any action for damages against the Contractor should this Agreement not be faithfully executed in every respect or should the Work furnished and installed by the Contractor not meet with the approval of the Owner

§ 5.4 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

«2.00» % «per annum»

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Mediation

Any claim, dispute, or other matter in question arising out of or related to this Agreement, if not resolved within 14 days following the notice of claim through discussions among the parties' officers having authority to resolve the claim, dispute, or other matter, shall be subject to mediation as a condition precedent to litigation. The parties shall work in good faith to select and agree upon a mediator within thirty (30) days after a demand for mediation is made by either party. If the parties cannot agree upon a mediator, then each party shall designate their preferred mediator as a representative. Each party's mediator representative shall then select a mediator that will conduct the mediation between the parties. If such matter relates to or is the subject of a lien arising out of the Contractor's services, the Contractor may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the matter by mediation or litigation.

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201-2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

[] Arbitration pursuant to Section 15.4 of AIA Document A201-2017

[] Litigation in a court of competent jurisdiction

[] Other *(Specify)*

«»

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2017.

§ 7.1.1 The Contract may be terminated by the Owner for cause or for convenience after ten (10) calendars days' written notice to Contractor. Further, Owner or the Contractor may terminate this Agreement as provided in Article 14 of AIA Document A201–2017

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

« Dr. Miskia Davis, »«Superintendent»
« Sunflower County Consolidated School District »
« PO Box 70
Indianola, MS 38751 »

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

«TBD »
« »
« »
« »
« »
« »

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

§ 8.7.1 The Agreement shall be governed by the laws of the State of Mississippi, and the mandatory and exclusive venue of any and all litigation shall be in Sunflower County, Mississippi.

§ 8.7.2 As a material consideration of the making of this Agreement, the modifications to this Agreement shall not be construed against the maker of said modifications.

§ 8.7.3 Notwithstanding anything to the contrary in this Agreement, or in any document forming a part hereof, there shall be no mandatory arbitration for any dispute arising hereunder.

§ 8.7.4 Article 1 of the General Conditions shall govern Contractor's use of the Construction Documents.

§ 8.7.5 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. As part of that responsibility, Contractor shall enforce the Owner's alcohol-free, drug-free, tobacco-free, harassment-free and weapon-free policies and zones, which will require compliance with those policies and zones by Contractor's employees, subcontractors, and all other persons carrying out the Contract. Further, Contractor shall use commercially reasonable efforts to perform background checks on all Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors and for which will be present at the jobsite for the Project.

§ 8.7.6 Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, to wear identification tags on the front of their persons during all times that they are on Owner's property. Such identification tags shall contain a current photograph and the worker's full name in a typeface large enough to be seen from a reasonable distance.

§ 8.7.7 Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, to park their personal motor vehicles on Owner's property only in the parking places designated by the Owner's campus principal. Any vehicles not parked in the appropriate locations shall be towed at the vehicle owner's sole expense.

§ 8.7.8 Contractor shall follow, and shall require all employees, agents or subcontractors to follow applicable ordinances of the municipality in which the Project is located.

§ 8.7.9 Contractor shall institute a theft deterrence program designed to restrict construction worker access to properties of Owner that are currently in use, to maintain supervision of Contractor's and Contractor's subcontractor's forces, and to reimburse the Owner or those persons suffering a theft loss which results from Contractor's forces or Contractor's subcontractor's forces' actions, omissions, or failure to secure the Work or adjoining property.

§ 8.7.10 The Contractor may not assign its responsibilities, duties, obligations and rights under this Agreement, without the express written consent of the Owner. This does not prevent Contractor from engaging subcontractors to perform various phases of the Project, but Contractor shall be fully responsible to Owner for the work, actions and omissions of all such subcontractors.

§ 8.7.11 This Agreement, in its entirety, shall be binding upon all the parties hereto, their respective successors, heirs, executors, administrators or assigns.

§ 8.7.12 Execution of this Agreement shall constitute approval and acceptance of all terms, covenants and conditions as modified and contained in the Contract Documents.

§ 8.7.13 This Agreement is subject to all applicable federal and state laws, rules, and regulations. Invalidity of any portion of this Agreement under the laws of the State of Mississippi or of the United States shall not affect the validity of the remainder of this Agreement.

§ 8.7.14 By signing this Agreement, Contractor represents and warrants the following to the Owner (in addition to any other representations and warranties contained in the Contract Documents), as a material inducement to the Owner to execute this Agreement, which representations and warranties shall survive the execution and delivery of this Agreement, any termination of this Agreement, and the final completion of the Work

.1 The Contractor is authorized to do business in Mississippi under Mississippi Code §31-3-1 et seq.

and is otherwise properly licensed by all necessary governmental and public and quasi-public authorities having jurisdiction over the Contractor and over the Work and the Project.

- .2 Contractor is financially solvent, able to pay all debts as they mature, and possessed of sufficient working capital to complete the Work and perform all obligations hereunder and that it has no reasonable belief that any of its subcontractors are not financially solvent, able to pay all debts as they mature, and possessed of sufficient working capital to complete their respective portion of the Work.
- .3 The Contractor is able to furnish the plant, tools, materials, supplies, equipment, and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so.
- .4 The Contractor's execution of this Agreement and performance thereof is within the Contractor's duly authorized powers.
- .5 The Contractor's duly authorized representative has visited the site of the Project, is familiar with the local conditions under which the Work is to be performed and has correlated observations with the requirements of the Contract Documents.
- .6 The Contractor possesses a high level of experience and expertise in the business administration, construction, construction management, and superintendence of projects of the size, complexity, and nature of this particular Project and will perform the Work with the care, skill, and diligence of such a contractor.

§ 8.7.15 No delay or omission by Owner in exercising any right or power accruing upon the noncompliance or failure of performance by Contractor of any of the provisions of this Agreement shall impair any such right or power or be construed to be a waiver thereof. A waiver by Owner of any of the covenants, conditions or agreements hereof to be performed by Contractor shall not be construed to be a waiver of any subsequent breach thereof or of any other covenant, condition or agreement herein contained.

§ 8.7.16 Contractor stipulates that Owner is a political subdivision of the State of Mississippi, and as such, enjoys immunities from suit and liability as provided by the Constitution and laws of the State of Mississippi. By entering into this Agreement, Owner does not waive any of its immunities from suit and/or liability, except as otherwise specifically provided herein and as specifically authorized by law.

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

- .5 Drawings

Number

« »

Title

Sunflower County
Consolidated School
District ESSER 2 and 3

Date

2 February 2022

.6 Specifications

Section	Title	Date	Pages
« Division 1 thru 49 »	Sunflower County Consolidated School District ESSER 2 and 3	2 February 2022	

.7 Addenda, if any:

Number	Date	Pages
« »		

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below: (Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages
« »		

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
« »			

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor’s bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

This Agreement entered into as of the day and year first written above.

SUNFLOWER COUNTY CONSOLIDATED SCHOOL DISTRICT

« »

OWNER (Signature)

«Dr. Miskia Davis, »«Superintendent»

(Printed name and title)

« »

CONTRACTOR (Signature)

« »« »

(Printed name and title)



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DRAFT AIA® Document A101® - 2017

Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « TBD » day of « » in the year « Two Thousand Twenty-Two » (In words, indicate day, month and year.)

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

« 21027 Sunflower County Consolidated School District ESSER 2 & 3, Phase 1 »
« »

THE OWNER:
(Name, legal status and address)

« Dr. Miskia Davis, » « Superintendent »
« Sunflower County Consolidated School District »
« PO Box 70
Indianola, MS 38751 »

THE CONTRACTOR:
(Name, legal status and address)

« TBD » « »
« »

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™-2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

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

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

This document is intended to be used in conjunction with AIA Document A201®-2017, General Conditions of the Contract for Construction. Article 11 of A201®-2017 contains additional insurance provisions.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

§ A.2.2 Liability Insurance

The Contractor will pay for and maintain such insurance as will protect the Owner and Architect from their contingent liability to others from damages because of bodily injury, including death, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance shall be filed with the Owner and Architect and will be the same limits set forth in this Exhibit A, Article A3.2.2.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the property insurance requires minimum deductibles, the Contractor shall pay the deductible and all other costs not covered because of such deductibles. If the Contractor or insurer increases the required minimum deductibles above the amounts so identified or if the Contractor elects to purchase this insurance with voluntary deductible amounts, the Contractor shall be responsible for the payment of the additional costs not covered because of such increased or voluntary deductibles.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, “all-risks” property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- [] **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner’s property, or the inability to conduct normal operations due to a covered cause of loss.

- [] **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

- [] **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

- [] **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

- [] **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

- [] **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured’s business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

- [] **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional

interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

« »

[« »] **§ A.2.5.2 Other Insurance** *(List below any other insurance coverage to be provided by the Owner and any applicable limits.)*

Coverage	Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner and Architect as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies and the Contractor's certificate of insurance must state that the Owner and the Architect are additional insureds under the referenced CGL policy and that all of the Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered by such CGL policy.

Any language contained on the certificate of insurance form or elsewhere to the contrary is deemed stricken.

The certificate of insurance must also state that all of the Contractor's contractual liabilities, including but not limited its indemnity obligations, are covered. Any terms and conditions contained in the certificate of insurance which are contrary to the Contractor's contractual obligations are hereby stricken from the certificate.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.1.4 Copies of Certificates. Furnish one copy of the certificate herein required for each copy of the Agreement, specifically setting forth evidence of all coverage required. Furnish to the Owner and Architect, copies of any

endorsements that are subsequently issued amending coverage or limits. If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract and the termination date of the policy, or the applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

<< >>

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million Dollars (\$ 1,000,000.00) each occurrence, Two Million Dollars (\$ 2,000,000.00) general aggregate, and <> (\$ <>) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than One Million Dollars (\$ 1,000,000.00) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than One Hundred Thousand Dollars (\$ 100,000.00) each accident, One Hundred Thousand Dollars (\$ 100,00.00) each employee, and One Hundred Thousand Dollars (\$ 100,000.00) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than One Million Dollars (\$ 1,000,000.00) per claim and One Million Dollars (\$ 1,000,000.00) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[] § A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below: *(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

« »

[] § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for Work within fifty (50) feet of railroad property.

[« »] § A.3.3.2.3 **Asbestos Abatement Liability Insurance**, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[«X »] § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an “all-risks” completed value form.

[«X »] § A.3.3.2.5 Property insurance on an “all-risks” completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

[« »] § A.3.3.2.6 **Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	Limits
----------	--------

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type	Penal Sum (\$0.00)
Payment Bond	The amount of the initial Contract Sum, plus the value of subsequent modifications and labor performed and materials or equipment supplied by others.
Performance Bond	The amount of the initial Contract Sum, plus the value of subsequent modifications and labor performed and materials or equipment supplied by others.

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

«Owner shall be included as an additional insured on all insurance policies obtained and maintained by Contractor.

If requested by Owner, Contractor shall obtain and maintain a Dual Oblige rider in favor of Owner’s lender, if any, for the Payment and Performance Bonds required under this Agreement. »

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DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

«21027 Sunflower County Consolidated School District ESSER 2 & 3»

THE OWNER:

(Name, legal status and address)

« Dr. Miskia Davis, »«Superintendent»
« Sunflower County Consolidated School District »
« PO Box 70
Indianola, MS 38751 »

THE ARCHITECT:

(Name, legal status and address)

«Dale | Bailey, An Association»
«One Jackson Place, Suite 250
188 East Capitol Street
Jackson, MS 39201-2100»
«Telephone Number: 601-352-5411

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13	MISCELLANEOUS PROVISIONS

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

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

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



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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. The Contract Documents shall include the Instructions to Bidders, the plans, the specifications, including Divisions 0 through 49, all Addenda and modifications to the plans and/or specifications, the Agreement between the Owner and Contractor, the performance and payment bonds, the notice to proceed and any executed change orders. Information and documentation pertaining to soil investigation data, laboratory investigations, soil borings and related information included herein are not part of the Contract Documents. In the event of a conflict between the provisions of Division 0 and any other section of the Contract Documents, such other sections(s) shall govern.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties. Large scale drawings shall govern over small scale drawings where there are differences or conflicts between such drawings. Where the word 'similar' appears on the plans, it shall be interpreted to mean 'identical' and shall require the Contractor to coordinate the actual conditions and dimensions of the location where the 'similar' conditions are shown to occur.

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.7.1 The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of an inconsistency between Drawings and Specifications or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation. Should the Contractor observe any inconsistency within the Contract Documents, he shall bring them to the Architect's attention for resolution as soon as possible after originally observed.

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

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

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

§ 1.2.4 It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent or whether or not incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as necessary to produce the intended results.

§ 1.2.5 The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the intent of the Contract Documents. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not in Contract ("N.I.C")", the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractors' expense to produce a product or system that is complete, appropriately tested, and in operable condition ready for use or subsequent construction or operation by the Owner or separate contractors. The omission of words or phrases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings unless otherwise indicated.

Except as noted otherwise, references to standard specification or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement of Bids.

Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect’s consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic’s lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner’s interest therein.

§ 2.2 Evidence of the Owner’s Financial Arrangements

§ 2.2.1 If the Project is a private project, not funded by public funds, then prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Intentionally deleted. .

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as “confidential,” the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose “confidential” information, after seven (7) days’ notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose “confidential” information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Intentionally deleted.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term “Architect”, “Engineer” or “Design Professional” as used in the Contract Documents refers to Dale | Bailey, an Association, One Jackson Place, Suite 250, 188 E. Capitol Street, Jackson, Mississippi 39201.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 Intentionally deleted.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner’s control and relevant to the Contractor’s performance of the Work with reasonable promptness after receiving the Contractor’s written request for such information or services.

§ 2.3.6 Intentionally deleted.

§ 2.4 Owner’s Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

The rights and remedies under this Article 2.4 are in addition to and do not in any respect limit any other rights of the Owner, including its termination rights under Article 14.

§ 2.5 Owner’s Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner’s expenses and compensation for the Architect’s additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the

jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term “Contractor” means the Contractor or the Contractor’s authorized representative. The relationship of Contractor to Owner shall be that of independent contractor, and nothing in the Contract Documents is intended to nor should be construed as creating any other relationship, expressed or implied, between Owner and Contractor.

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor’s review is made in the Contractor’s capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor’s notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor’s proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

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

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. Some Sections of the Specifications may not allow substitution of materials, products, or equipment. Where substitution is allowed the request for substitution will only be considered if made in strict accordance with the requirements of Article 3.4.4 below and Section 016300 of the specifications.

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

§ 3.4.4 After the Contract has been executed, the Owner and the Architect may consider a request for the substitution of products in place of those specified only under the conditions set forth in Section 016300 of the specifications.

By making requests for substitutions, the Contractor:

- .1 Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respect to that specified;
- .2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 Certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
- .4 Shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects at its costs.

All substitutions shall be submitted within 30 days of the Notice to Proceed, as per Section 016300 of the specifications.

§ 3.4.5 Contractor represents that it has independently investigated, considered and understands the labor conditions in the area surrounding the Project and acknowledges that such conditions may impact the Contractor's cost and/or time of performance of the Contract. Therefore, Contractor further represents that the Contract Price is based upon Contractor's independent investigations into such labor conditions and that the Contract time is reasonable and the date of Substantial Completion is obtainable. As a result, Contractor assumes the risk of increased costs, if any, incurred by it arising out of or related to such labor conditions and acknowledges that Contractor and its surety will reimburse Owner for any additional costs Owner incurs arising out of or related to such labor conditions.

§ 3.4.6 Materials shall conform to manufacturer's standards in effect as of the date they are approved and shall be installed in strict accordance with manufacturer's directions.

§ 3.4.7 **Rejection of Defective Work.** The Owner or Architect's inspection of the Work shall not relieve the Contractor of its responsibilities to perform the Work in accordance with the Contract Documents and all defective work shall be corrected. Unsuitable work may be rejected by the Architect or Owner, whether or not such work and materials have been previously overlooked or misjudged by the Architect or Owner and accepted for payment. If the Work or any part of the Work shall be found defective any time before the final completion of the Work, the Contractor shall immediately correct such defect satisfactory to the Architect or Owner. If any material brought on the site for use in the Work, or selected for use in the Work, shall be rejected by the Architect or Owner as unsuitable or nonconforming with the Contract Documents, the Contractor shall immediately remove such materials from the vicinity of the Work. Nothing contained herein shall operate in any manner as a waiver of any claim Contractor may have against the Owner or the Architect relating to the inspection of the Work.

§ 3.4.8 **Debris.**

§ 3.4.8.1 The Contractor shall not permit the accumulation of debris, both exterior and interior. The Work area shall always be kept satisfactorily clean. The Contractor shall remove debris from the Work site and dispose of it at any private or public dump the Contractor may choose. The Contractor shall arrange for and obtain any approvals necessary from the owners or officials in charge of such dumps and shall bear all costs, including fees resulting from such disposal, in the Contract Price, as applicable.

§3.4.8.2 Garbage shall be removed as frequently as necessary in order to satisfy the requirements of this section.

§3.4.8.3 No open fire shall be permitted on site.

§3.4.8.4 Chemical waste shall be stored in corrosion-resistant containers, removed from the Project site, and disposed of not less frequently than monthly unless directed otherwise. Disposal of chemical waste shall be according to requirements of the Environmental Protection Agency (EPA) and the applicable state and local agencies.

§3.4.8.5 Fueling and lubricating of vehicles and equipment shall be conducted to afford the maximum protection against spills and evaporation. Lubricants to be discarded or burned shall be disposed of according to approved procedures meeting all applicable federal, state and local regulations. In case of an oil or hazardous materials spill large enough to violate federal, state or applicable local regulations, the Architect or Owner shall be notified immediately. The Contractor shall be responsible for immediately cleaning up any such oil or hazardous waste spills resulting from its operations. Any costs incurred in cleaning up any such spills shall not increase the GMP or Price, as applicable.

§3.4.9 **Site and Weather Protection.** The Contractor shall take necessary precautions during the execution of the Work involving demolition not to disturb or damage any existing structure, landscaping, walks, roads or other items scheduled to remain. Subject to the other terms of the Contract Documents, the Contractor shall restore any damaged items to original condition as directed by the Architect or Owner. The Contractor shall provide and erect acceptable barricades, fences, signs and other traffic devices to protect the Work from traffic and the public necessary and as required by applicable laws, ordinances, codes, rules and regulations..

§3.4.10 **Archaeological and Historical Resources.** All items having any apparent historical or archaeological interest discovered during any construction activities shall be carefully preserved and reported immediately to the Owner for determination of appropriate actions to be taken. Any increases to Contractor's time or cost of performance due to historical or archaeological items discovered on the site shall entitle Contractor to a Change Order equitably adjusting the Contract Time and the Contract Price accordingly.

§3.4.11 **Safety Requirements.**

§3.4.11.1 The Contractor must comply with all federal, state and local safety laws and regulations of the applicable authority in connection with the Work performed under this Contract.

§3.4.11.2 This Project is subject to compliance with Public Law 92-596 "Occupational Safety and Health Act of 1970" (OSHA) with respect to all rules and regulations concerning construction, U.S. Code Title 29, Section 651 et seq., including Volume 36 numbers 75 and 105, of the Federal Register as amended, and as published by the U.S. Department of Labor.

§3.4.11.3 As between Owner and Contractor, Contractor will maintain a Safety Program that requires compliance by everyone on the Project Site.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty is not exclusive but is in addition to any additional contract remedies available to Owner.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 The Contractor shall secure and pay for the building permit and all other permits, fees, licenses, inspections and all other approvals and charges necessary for proper execution and completion of the Work.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. Contractor is responsible to comply and to assure compliance by its subcontractors and suppliers with all local, state and federal statutes, ordinances, regulations or requirements relating to the performance of the Work, including but not limited to: OSHA and health and safety requirements; labor requirements; worker's compensation and unemployment requirements; insurance requirements; equal opportunity requirements, tax and withholding requirements; noise requirements; hazardous substance requirements; and waste disposal requirements. Contractor is further responsible for giving all notices required by all of the foregoing law. Contractor shall indemnify and hold harmless the Owner and their respective employees, officers and agents from any claims, damages, fines, penalties and attorney fees incurred by Owner or its employees, officers or agents as a result of Contractor's failure to comply with the foregoing obligations.

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

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect

shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2. except when installation is specified to be included as part of the allowance in the General Requirements (Division 1 of the Specifications).

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

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

The Contractor shall also employ a competent project manager who shall be primarily responsible for the Contractor's home office activities in connection with the Contract.

The Owner shall have the right, which shall be exercised in a reasonable fashion, to approve the project manager and/or superintendent employed by the Contractor, either before or during the progress of construction.

The superintendent and project manager for the project shall be designated by the Contractor at the pre-construction conference. After Owner's approval of such project manager and superintendent, they shall not be replaced by the Contractor without the Owner's prior written consent, which consent is required unless the Contractor submits proof satisfactory to the Owner that the superintendent and/or the project manager should be terminated by the Contractor for cause.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals but, in any event, no less than submission of a revised schedule with each monthly application for payment pursuant to Section 9.3 as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 Time being of the essence, the Contractor shall perform the Work in accordance with the most recent schedule submitted to and approved by the Owner and Architect.

§ 3.10.4 To the extent that the Date for Substantial Completion is impacted by any concealed condition or other event for which Contractor is entitled to a time extension, Contractor shall provide Owner with a proposal to accelerate the performance of the Work including estimated costs to be incurred to mitigate the time impact such event shall have on Substantial Completion of the Work. If accepted by Owner, a Change Order will be executed to reflect the change in the Contract Price and the Contract Time if any.

§ 3.10.5 The Contractor shall have weekly progress meetings at the Job Site. Progress of the Work shall be reported in detail with reference to the Construction Schedule. Each interested Subcontractor shall have a competent representative present to report the condition of its portion of the Work and to receive information.

§ 3.10.6 The Contractor will provide or notify Owner or Owner's representative if applicable of needed approvals of submittals, requests for information and requests for change, Owner selections or Owner information or services more than fourteen (14) days prior to the time such approvals or information will be needed so as not to delay the Work. Contractor will further advise Owner and Owner's representative of the date by which such selections must be made. Contractor may not seek to extend the Contract Completion Date for delays in Owner selections or Owner information if Contractor fails to give Owner notice of the need for selections.

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

§ 3.12.8 The Work shall be in accordance with reviewed submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's review of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written response to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's review thereof. Unless such written notice has been given, the Architect's review of a Shop Drawing, Product Data, Sample, or similar submittal shall not constitute acceptance of any changes not requested on the prior submittal.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's review of a resubmission shall not apply to such revisions. The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional resubmittals.

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The performance and design criteria specified by the Architect in the Contract Documents shall be prepared in accordance with the applicable standard of

care. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 During performance and up to the date of final acceptance of the work by the Owner, the Contractor shall be responsible for the protection of the person and property of others on or adjacent to the site from damage, loss or injury resulting from the performance of the Work as provided in Articles 3, 4, 5, and 10. The Owner shall not, in

any case, be liable for any damage caused to any property by whomsoever owned, nor shall either of them, in any event, be responsible or liable for personal injury or death caused, by the act or omission of the Contractor, its officers, directors, employees, agents, Contractors or invitees.

§ 3.18.2 To the fullest extent permitted by law, the Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance or nonperformance of the Work. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.3 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4. All Change Orders, Construction Change Directives and field directives shall require the approval of the Owner in writing to be binding on the Owner and before Contractor is required to commence the changed Work.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 Intentionally deleted.

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in

number and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a Separate Contractor or the subcontractors of a Separate Contractor.

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

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

§ 5.2.1 The Contractor, with its first Application for Payment and as a condition to the Owner’s obligation to make payments to Contractor under Article 9 of the General Conditions as supplemented herein shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor’s Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.2.5 The Contractor’s unauthorized substitution of any subcontractor, supplier, person, or entity previously identified by Contractor in accordance with Article 5.2.1 shall entitle the Owner to reject the work, materials or product furnished and require removal and replacement at no additional cost to the Owner.

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces and to award separate contracts either in connection with other portions of the Project or other construction or operation on the site. In such event, the Contractor shall coordinate its activities with those of the Owner and of Separate Contractors so as to facilitate the general progress of all work being performed by all parties. 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 detailed work of the Owner or Separate Contractors and shall immediately notify the Architect of lack of progress or delays by Separate Contractors which are affecting Contractor's Work. Failure of Contractor to keep informed of the progress of the work of the Owner or Separate Contractors and/or failure of Contractor to give notice of lack of progress or delays by the Owner or Separate Contractors shall be deemed to be acceptance by Contractor of the status of progress by Separate Contractors for the proper coordination and completion of Contractor's Work. If, through acts or neglect on the part of the Contractor, the Owner or any Separate Contractors shall suffer loss or damage or assert any claims of whatever nature against the Owner, the Contractor shall defend, indemnify and hold harmless the Owner from any such claims or alleged damages, and the Contractor shall resolve such alleged damages or claims directly with the Separate Contractors.

§ 6.2 Mutual Responsibility

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

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

§ 6.2.3 Intentionally deleted.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Contractor shall be entitled to a claim for an increase in the Price or an equitable adjustment in the Price only in the following circumstances and compliance with the requirements of this Agreement and Article 15 of the General Conditions. When submitting its Change Order proposal, the Contractor shall include and set forth in clear and reasonable detail breakdowns of labor and materials for all trades involved and the estimated impact on the construction schedule to the extent then reasonably known by Contractor. The Contractor shall furnish spreadsheets from which the breakdowns were prepared, plus spread sheets if requested of any Subcontractors.

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work. No course of conduct or dealings between the parties, nor verbal express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for the in the Contract Documents in the absence of written Notice as provided in the Contract Document.

§ 7.1.4 The combined overhead (overhead includes general home office, field personnel, superintendents, and all costs attributable to field and office personnel), taxes (including Mississippi's 3.5 percent gross receipts tax), insurance and profit included in the total cost to the Owner of a change in the Work shall be based on the following schedule:

- .1 For the Contractor, the Work performed by the Contractor's own forces, fifteen percent of the cost.
- .2 For the Contractor, for Work performed by the Contractor's Subcontractors, ten percent of the amount due the Subcontractor.
- .3 For each Subcontractor or Sub-subcontractor involved, for Work performed by that Subcontractor's or Sub-subcontractor's own forces, fifteen percent of the cost.
- .4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractor, ten percent of the amount due the Sub-subcontractor.
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.7.
- .6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change involving an amount over Five Hundred Dollars be approved without such itemization.

§ 7.1.5 If the methods set forth in Section 7.1.4 is not applicable, the Contractor, provided he receives a written order signed by the Owner, shall promptly proceed with the Work involved. The cost of such Work shall then be subject to a recommendation by the Architect on the basis of the reasonable expenditures and savings of those performing the Work attributable to the change, including, in the case of an increase in the Contract Sum, a

reasonable allowance for overhead and profit. The Architect recommendation shall be advisory and admissible in any proceeding, but it shall not be binding on Contractor or Owner in the absence of a mutual agreement. If the Owner and Contractor cannot reach a mutual agreement, any Claim shall be subject to the provisions of Article 15.

§ 7.2 Change Orders

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

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

§ 7.2.2 Contractor's execution of a change order constitutes a final settlement to the Contract Sum and construction schedule and the Contract Time for all matters relating to or arising out of the change in the Work that is the subject of the change order including, but not limited to, all direct and indirect costs associated with such change, all extended direct job site and home office overhead expenses and any and all delay and impact cost for the change, whether alone or in combination with other changes, including any impact, ripple or cumulative effect resulting therefrom, if any.

§ 7.2.3 Adjustments to the Contract Sum by change order shall be based upon one of the methods set forth in Article 7.3.3.1, 7.3.3.2, 7.3.3.3 or 7.3.3.4, as appropriate. A reasonable allowance for the combined overhead and profit included in the change order shall be based upon the schedule set forth in Article 7.1.4, as supplemented.

§ 7.2.4 In order to facilitate consideration of change order requests, all such requests, except those involving an amount less than \$500 must be accompanied by a complete itemization of costs, including labor, materials and subcontractor costs which shall likewise be itemized. Changes for more than \$500 will not be approved without such itemization.

§ 7.3 Construction Change Directives

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation; The cost or credit to the Owner resulting from a change in the work shall be calculated in the same manner as described in Subparagraph 7.1.4 (above);
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;

§ 7.3.4 Intentionally deleted.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

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

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

§ 7.3.8 The amount of credit to be given by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be the actual net cost plus reasonable allowance for overhead on net cost and profit thereon as approved by the Architect and Owner. . When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

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

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work and that the Contractor is fully capable of properly completing the Work within the Contract Time.

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

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or other causes beyond the

Contractor's control; or by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.1.1 The words "other causes beyond the Contractor's control" as used in Subparagraph 8.3.1 shall not be interpreted as pertaining to bad weather days. The term "consecutive calendar days", as used in the bid form and the Agreement Between the Owner and Contractor to define a specific time period, shall include bad weather days. The term "bad weather days" shall be defined as days which adverse weather conditions, such as rain, snow, sleet, wind, fog, thunderstorms, hurricanes, lightning, temperature, rising water, or other extreme weather conditions, were excessive to the extent that the Contractor could not access the building site or could not perform the work in its proposed or proper sequence. No time extensions shall be granted for "bad weather days".

§ 8.3.1.2 Notwithstanding any other provisions of the Agreement Between the Owner and Contractor, it is mutually understood that the time extensions for changes in the work will depend on the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the contract completion date will be extended only for those specific elements so delayed and that the remaining contract completion dates for all other portions of the work not be altered.

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

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents. No delay, interference, hindrance or disruption, from whatever source or cause, in the progress of the Contractor's Work shall be a basis for an extension of time and/or additional compensation, unless the delay, interference, hindrance or disruption (1) is without the fault and not the responsibility of the Contractor, its subcontractors and/or suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the Contractor's updated and accepted construction schedules. The Contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and that delays to construction activities, which do not affect the overall completion of the Work, do not entitle the Contractor to any extension in the Contract Time and/or increase in Contract Sum.

§ 8.3.4 All claims by the Contractor for an increase in the Contract Time must follow the procedures set forth in Articles 15.1.2, 15.1.3, 15.1.5 and 15.1.6, including the requirement that the Contractor give written notice of any claim within twenty-one (21) days after occurrence of the event giving rise to such claim or within twenty-one (21) days after the Contractor first recognizes the condition giving rise to the claim, whichever is earlier.

§ 8.3.5 If the Contractor submits a schedule indicating or otherwise expressing an intent to complete the Work prior to the date of substantial completion, the Owner shall have no liability to the Contractor for any failure by the Contractor to complete the Work prior to the expiration of the Contract Time.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment will be the current edition of the AIA Document G702, Application and Certification for Payment, supported with AIA Document G703, Continuation Sheet.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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

§ 9.3.1.3 In any contract awarded by the state of Mississippi or any agency, unit, or department of the State of Mississippi, or by any political subdivision thereof, the amount of retainage that may be withheld is governed by Mississippi law.

§ 9.3.1.4 There will be no extension of time due to weather.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.2.1 Payment for materials stored at some location other than the Project site, may be approved by the Architect and the Owner after the Contractor has submitted the following items:

- .1 An acceptable Lease Agreement between the Contractor or one of its subcontractors or suppliers and the owner of the land, or building, where the materials are stored covering the specific area where the materials are located.
- .2 Consent of Surety or other acceptable bond to cover the materials stored off-site.
- .3 All Perils Insurance coverage for the full value of the materials stored off-site.
- .4 A Bill of Sale from the Manufacturer to the Contractor for the stored materials.
- .5 A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the Project.
- .6 A review by the Architect of the materials stored off-site prior to release of payment.
- .7 Proof of payment of stored materials verified by the supplier must be submitted to the Architect within thirty (30) days of the Application for Payment on which payment for said materials was made. If proof of payment is not submitted within thirty (30) days, then payment for said materials will be deducted from the next application for payment and withheld until proof of payment is received.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

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

- .1 defective Work not remedied;
 - .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
 - .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
 - .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
 - .5 damage to the Owner or a Separate Contractor;
 - .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- or
- .7 failure to carry out the Work in accordance with the Contract Documents.
 - .8 The letter from the Contractor which is required by Article 15.1.6.2 has not been received.
 - .9 Failure to properly coordinate all phases of the work;
 - .10 Failure to verify that all materials, equipment, and work in full accordance with the Contract Documents;
 - .11 Failure to comply with the specified submittal procedures.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

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

§ 9.6 Progress Payments

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

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

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

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

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Whether or not the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision. The amount retained by the Contractor from each payment to each Subcontractor and material supplier shall not exceed the percentage retained by the Owner from the Contractor for the Subcontractor's Work.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial completion for purposes of this Contract occurs only upon Contractor's compliance with the following conditions precedent: (a) the Contractor furnishes to the Architect all close-out documents required by the Contract Documents in a form satisfactory to the Architect and the Owner, (b) the Contractor furnishes the manufacturers' certifications and/or warranties required by the Contract Documents; (c) the Contractor furnishes the Guarantee of Work set forth herein below; and (d) the Architect certifies that the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose.

The Guarantee of Work shall be submitted as a separate document signed by Contractor and Contractor's Surety and shall state the following:

Contractor and Contractor's Surety hereby guarantee that all Work performed on the Project is free from defective and/or nonconforming materials and workmanship and that for a period of one year from the date of substantial completion or such longer period of time as may be called for in the Contract Documents for such portions of the Work, Contractor or its Surety will repair and/or replace any defective and/or nonconforming materials and workmanship in accordance with the requirements of the Contract Documents.

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

§ 9.8.2.1 The Contractor shall be responsible for the costs of inspections made by the Architect including any and all other related expenses incurred by the Architect for providing services for the Project required by failure of the Contractor to achieve final acceptance / completion of the Project within 30 days after the first occurrence of the below described events:

1. Specified date of Substantial Completion; or
2. Actual date of Substantial Completion.

The costs of the Architect's additional services shall be deducted by the Owner from the Contractor's final application for payment to pay the Architect for additional services required by the Contractor's failure to achieve final completion of the project within the 30-day period described above.

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

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence and continue for one (1) year from the date of Substantial Completion except that the roof system shall be warranted for a period of three (3) years from the date of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents. Contractor's execution of the Certificate of Substantial Completion constitutes Contractor's representation that the items on the list accompanying the Certificate can and will be completed by Contractor and his subcontractors within thirty (30) days of Contractor's execution of the Certificate. Based upon this representation by Contractor and upon the acknowledgment of the Architect that the listed items remaining can be completed within thirty (30) days, the Owner agrees to execute the Certificate of Substantial Completion. If Contractor fails to complete the items on the list within thirty (30) days of Contractor's execution of the Certificate, then the Owner, at its option and without prejudice to any other rights or remedies it may have under this Contract or otherwise and without notice to Contractor or Surety, may proceed to have same completed and to deduct the reasonable costs thereof from the amounts then due or thereafter to become due to Contractor.

§ 9.8.6 The costs of inspections made by Architect which are not required by Articles 4, 9.8 or 9.10 of the General Conditions and any other inspection required by Article 12 other than the year-end inspection itself, will be the responsibility of the Contractor and will be deducted by the Owner from the Application for Payment submitted after the Owner's receipt of the Architect's statement for its costs of additional inspections. These costs are not the result of Contractor's failure to and timely complete the Contract within the specified time and, therefore, such costs are in addition to and not a part of any liquidated damages calculation, if any

§ 9.8.7 Upon the Owner's acceptance of the Work as substantially complete and upon Contractor's compliance with all conditions precedent to substantial completion as stated in Section 008000, Article 9.8.1 and upon application by the Contractor, the Owner will pay to the Contractor all retainage held by the Owner less an amount equal to the greater of (a) two percent (2%) of the Contract Sum, or (b) two hundred percent (200%) of the estimated cost of the Work remaining to be performed by the Contractor in accordance with the Architect's determination. Final payment, including all retainage, shall be made at the time and in the manner provided for final payment in accordance with the provisions of Article 9.10 and the additional conditions precedent to final acceptance / payment set forth in Section 008000, Article 9.8.5.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 The Owner's occupancy or use of any completed or partially completed portions of the Work shall not affect Contractor's obligation to complete incomplete items on the list attached to the Certificate of Substantial Completion within the time fixed in the Certificate and does not waive Owner's right to obtain completion of incomplete items at Contractor's expense upon Contractor's failure to timely complete same.

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

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

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect

finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.11 Liquidated Damages

§ 9.11.1 See Article 3.4.1 of the A101-2017 Standard Form of Agreement Between Owner and Contractor

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Architect shall not administer the Contractor's performance of its duties and responsibilities under Article 10 (including Articles 10.1 through 10.6) because the initiation, maintenance and supervision of safety precautions and programs is the sole responsibility of the Contractor as means, methods, techniques, sequences, and procedures of construction and, therefore, is not part of the Contractor's scope of Work which is to be administered by the Architect.

§ 10.2 Safety of Persons and Property

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or

entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.1.5 All insurance coverage procured by the Contractor shall be provided by insurance companies having policy holder ratings no lower than "A" and financial ratings not lower than "XII" in the *Best's Insurance Guide*, latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in

accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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

Intentionally deleted.

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner in good faith and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5. Prior to the end of the one-year period, (three years for roof systems), the Architect

may schedule a warranty inspection which shall be attended by the Architect, the Owner, the Contractor, and all major subcontractors. During this inspection, the parties shall identify all defective and/or nonconforming items and fix a time within which all defective and/or nonconforming items shall be repaired and/or replaced.

Within the one-year period (three years for roof systems) provided for in the Guarantee of Work required by Article 9.8.1, if repairs or replacement are requested by Owner in connection with the Work which, in the opinion of the Owner, are rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the Contract Documents, the Contractor and/or its Surety shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition in every particular, all such Work, correct all defects therein and make good all damages to the building, site, equipment or contents thereof; and make good any work or materials or the equipment and contents of said buildings or site disturbed in fulfilling any such guarantee. If, after notice or within the time agreed upon by the parties at the warranty inspection, the Contractor and/or its Surety fail to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected in accordance with Article 2.5 and the Contractor and his Surety shall be liable for all expenses incurred. All special guarantees applicable to definite parts of the Work stipulated in the Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

§ 12.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by Mississippi law.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest as provided by applicable Mississippi law or as required by the Owner in the Contract.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3,

constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, , and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.
- .5 fails to achieve Substantial Completion of the Project as described in Section 008000, Article 9.8.5, within the time stated therein; or
- .6 fails to meet any deadline required by the Contract. Contractor acknowledges that time is of the essence of this Contract and that all deadlines required by the Contract are critical to timely completion of the Contract. Therefore, Contractor agrees that its failure to meet any deadline constitutes a substantial and material breach of this Contract, entitling the Owner to terminate the Contract.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon advice by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.2.5 If the Owner terminates the Contract for cause, and it is determined for any reason that the Contractor was not actually in default under the Contract at the time of termination, the Contractor shall be entitled to recover from the Owner the same amount as the Contractor would be entitled to receive under a termination for convenience as provided by Article 14.4. The foregoing shall constitute the Contractor's sole and exclusive remedy for termination

of the Contract. In no event shall the Contractor be entitled to special, consequential, or exemplary damages, nor shall the Contractor be entitled to anticipated profits resulting from termination of this Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement. The Contractor shall not be entitled to receive any payment for either overhead or profit on work not performed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

.1 **Concealed Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than five (5) days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum. Contract Time shall be addressed in accordance with Section 15.1.5 below. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons.

.2 **Claims for Additional Cost For Reasons Other than Concealed Conditions.** If the Contractor claims that it should be entitled to additional compensation for any damage sustained or may be sustained (i) by reason of any act or omission of the Owner or any other person for which the Owner is responsible or by reason that Owner directed the Contractor to perform any work which it believes is not required to be performed by the provisions of each Contract (collectively an "Event"), then Contractor shall within five (5) days after it first had notice of an Event, deliver to the Architect and Owner a written statement of the nature and basis of its claim and within twenty (20) days, the Contractor shall deliver to the Owner a verified itemized statement of the details and amount of such damage or extra work. If the Owner shall require any additional data, the Contractor shall furnish the same within three (3) days after written demand therefore. Unless such notice, statements and data shall be delivered within the times aforesaid, all claims for additional compensation or damages for such matters shall be deemed waived. Compliance by the Contractor with the provisions of this paragraph shall not, however, be deemed an admission by the Owner nor raise any presumption as to the validity or correctness of the claim. Contractor shall not be entitled to additional compensation by reason of any inconsistency or deficiency in the design documents.

.3 **Change Orders and Construction Change Directives.** To the extent that an Owner wishes to change the scope of Work under the Contract documents, the parties shall agree to any compensation and time as part of such agreed Change Order as provided in Article 7.2. Contractor shall not be obligated to perform any material change in the scope of Work in the absence of an executed Change Order. Neither the Owner nor Architect shall be entitled to utilize the provisions for Construction Change Directives as provided in Article 7.3 for material changes in the scope of Work under the Contract Documents

.4 The Owner will not be responsible for damages or additional compensation due to delays in the work caused by, government delays, utility company delays, or other delays beyond the control of the Owner.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor is delayed on its critical path at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, concealed conditions or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order to the extent such delay will prevent the Contractor from achieving Substantial Completion within the Contract Time as provided below. The entitlement to a time extension provided

in this paragraph shall not apply if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension in the Contract Time under the Contract Documents. The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (i) is not caused, or could not have been anticipated, by the Contractor and (ii) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay or reasonable likelihood that the delay will occur for such reasonable time as the Architect may determine

§ 15.1.6.2 The Contractor assumes the risk of both normal and abnormally adverse weather and will not be entitled to any time extension or Contract price adjustment for either normal or abnormally adverse weather encountered during construction, notwithstanding any other provision of the Contract to the contrary.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.1.8 The Contractor expressly agrees that the Article 15 Claims and Disputes process is the only dispute resolution mechanism that will be recognized by the parties for any claims put forward by the Contractor, notwithstanding any other claimed theory of entitlement on the part of the Contractor or its subcontractors or suppliers against the Owner and/or the Architect or any of their design consultants, including, but not limited to, all claims of breach of contract, breach of warranty, misrepresentation, negligence, professional negligence, and/or any other tort.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Either party may file for mediation of a dispute at any time. Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which through a mutually agreed upon mediator, unless the parties are unable to agree, at which point the mediation shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Intentionally deleted.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 LITIGATION

All claims or other matters in dispute which cannot be resolved by mutual agreement or Mediation shall be subject to litigation in a Court of appropriate jurisdiction. The Parties agree to that the exclusive jurisdiction and venue for any and all claims or disputes arising from or related to the Project or the Contract Documents shall be in Sunflower County, Mississippi. The prevailing party shall be entitled to their reasonable attorney fees and expenses incurred in any litigation of a claim or dispute relating to any Project.

SECTION 009113 - ADDENDA

PART 1 - GENERAL

1.1 ADDENDA

- A. Any Addendum issued prior to bid date on this Project will be included in Section 009113 and become a part of the Standard Form of Agreement between the Owner and the Contractor.
- B. Acknowledge receipt of Addenda in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.
- C. The Bidder is responsible for obtaining a copy of each Addendum issued. The Addenda will be posted on the Architect's website. They will also be available for purchase from participating plan rooms.
- D. Bidders who have contacted the Architect's office and requested to be included on the Bid Registry List will be notified by email when an Addendum has been issued to the email address provided by the Bidder at registration.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF DOCUMENT 009113

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DIVISION 01
GENERAL REQUIREMENTS

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under Owner's separate contracts.
5. Owner-furnished/Contractor-installed (OFCI) products.
6. Contractor's use of site and premises.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and Drawing conventions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: 21027 Sunflower County Consolidated School District ESSER 2 and 3, Phase 1.

1. Project Location: .

- a. Site a: AW James Elementary School, 400 South Blvd, Drew, MS 38737
- b. Site b: Carver Elementary School, 404 Jefferson St, Indianola, MS 38751
- c. Site c: Drew Hunter Middle School, 10 Swoope Rd, Drew, MS 38737
- d. Site d: Lockard Elementary School, 302 College Ave, Indianola, MS 38751
- e. Site e: Robert L Merritt Junior High School, 705 Kinlock Rd, Indianola, MS 38751
- f. Site f: Ruleville Central Elementary School, 410 L F Packer Dr, Ruleville, MS 38771
- g. Site g: Ruleville Middle School, 250 Oscar St, Ruleville, MS 38771

B. Owner: Sunflower County Consolidated School District, PO Box 70, Indianola, Mississippi.

1. Owner's Representative: Dr. Miskia Davis, Superintendent, mdavis@sunflower.k12.ms.us, 662-887-4919.

C. Architect: Dale Partners Architects, 188 E. Capitol Street, Suite 250, Jackson, Mississippi, 39201.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Replacement of mechanical systems including finish plumbing as well as repairs to finishes and structure that directly relate to this work at 7 School sites throughout Sunflower

County. This work will include new ceilings, walls where needed to conceal plumbing, new bathroom fixtures as needed to allow for ADA access, paint, and other Work indicated in the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.4 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Driveways, Walkways, and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated. Where HVAC is impacted by scope of work, Contractor is responsible for maintaining Temperature and humidity levels in a range generally accepted as comfortable to the general public.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 3:00P PM to 6:00 AM , Monday through Friday, and anytime on weekends and holidays, unless otherwise indicated.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products , alcoholic beverages, and other controlled substances on Project site is not permitted.
- F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Contingency allowances.
- C. Related Requirements:
 - 1. Section 0140000 "Quality Requirements" for procedures governing the use of allowances for testing and inspection.
- D. The contingency allowance or any allowance shall have all overhead and profit added at bid time to the bid price, such that any expenditure of allowances cannot add any overhead and profit to them.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight , and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner are not included in the allowance and shall be included in the contract sum and shall not be charged as an addition to the contract sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 01: Lump Sum Contingency Allowance for AW James Elementary
 - 1. Include the Sum of Seventy-Five Thousand Dollars (\$75,000.00) total for Construction Contingency Allowance.
- B. Allowance No. 02: Lump Sum Contingency Allowance for Carver Elementary
 - 1. Include the Sum of One Hundred Eighty-Five Thousand Dollars (\$185,000.00) total for Construction Contingency Allowance.
- C. Allowance No. 03: Lump Sum Contingency Allowance for Drew Hunter Middle School
 - 1. Include the Sum of One Hundred Thirty-Five Thousand Dollars (\$135,000.00) total for Construction Contingency Allowance.
- D. Allowance No. 04: Lump Sum Contingency Allowance for Lockard Elementary
 - 1. Include the Sum of One Hundred Eighty-Five Thousand Dollars (\$185,000.00) total for Construction Contingency Allowance.
- E. Allowance No. 05: Lump Sum Contingency Allowance for Merritt Middle School
 - 1. Include the Sum of One Hundred Thirty-Five Thousand Dollars (\$135,000.00) total for Construction Contingency Allowance.
- F. Allowance No. 06: Lump Sum Contingency Allowance for Ruleville Elementary School
 - 1. Include the Sum of Eighty Thousand Dollars (\$80,000.00) total for Construction Contingency Allowance.
- G. Allowance No. 07: Lump Sum Contingency Allowance for Ruleville Middle School

1. Include the Sum of Ninety-Five Thousand Dollars (\$95,000.00) total for Construction Contingency Allowance.
- H. Allowance No. 08: Hardware Allowance for Alternate No. 1 Ruleville Elementary Multi-Purpose Building New Construction.
1. Include the Sum of Twelve Thousand Dollars (\$12,000.00) total for hardware allowance to be included in Additive Alternate No. 1. This allowance includes material only; installation and miscellaneous equipment shall not be included in this allowance, but shall be included in the base bid contract scope.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.

1.2 DEFINITIONS

- A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1. Prep, Prime, Paint Wall Tile.

1. Description: Provide a unit price for preparing wall surfaces by infilling recessions so that all surfaces are on the same plane, that gaps and cracks are filled with mastic, and that missing tiles are replaced as needed to make repairs as well as priming surfaces with product that will adhere to glossy tile surfaces with smooth appearance and installing paint topcoat with smooth appearance of color to be determine by Architect.
2. Unit of Measurement: Square Feet

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 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 the 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. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise 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. Execute accepted alternates under the same conditions as other work of the Contract.
- C. 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

- A. Additive Alternate No. 01 : Ruleville Elementary Multi-Purpose Building New Construction .

1. Alternate Description: Build new structure at the Ruleville Elementary School Site. Provide all site work and utilities as well as all necessary construction to complete new structure.
- B. Additive Alternate No. 02: Ruleville Elementary Windows
1. Alternate Description: Provide all work necessary to demolish windows and install new metal panels and windows per design documents, including fenestration's, at Ruleville Elementary.
- C. Additive Alternate No. 03: Lockard Windows.
1. Alternate Description: Provide all work necessary to demolish windows and install new metal panels and windows per design documents, including fenestration's, at Lockard Elementary.
- D. Additive Alternate No. 04: All Sites - Remove All Radiant Heaters & Repair Finishes
1. Alternate Description: Provide all work necessary to demolish all radiant heaters throughout all project sites and repair damage to finishes uncovered therein.
- E. Additive Alternate No. 05: All Sites - Remove All Remaining & Discontinued Heating System Piping
1. Alternate Description: Provide all work necessary to demolish all remaining piping associated with existing heating systems to be discontinued throughout all project sites including hazardous material abatement if required. Repairs to buildings, directly related to this work, shall include shell repair as needed to prevent air/moisture intrusion and finish repairs to prevent sound transmission between adjacent spaces.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use Contractor's standard form.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific

- features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES .
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed . Requests received after that time may be considered or rejected at discretion of Architect.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution does not require extensive revisions to the Contract Documents.
 - b. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, Architect's Supplemental Instructions.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use Forms acceptable to the Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect .
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use a form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 .

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 . Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements
 - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administration forms and schedules, including the following.
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Separate Values into divided sections according to Site location as indicated in project summary with headings indicating each section and totals at the end of each section.
 - 3. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 4. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703 .

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling fivepercent of the Contract Sum and subcontract amount.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
6. Provide separate line item in the schedule of values for initial cost of materials, each subsequent stage of completion, and for total installed value for that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit five signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment .
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Sustainable design action plans, including preliminary project materials cost data.
 5. Schedule of unit prices.
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
- H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Updated final statement, accounting for final changes to the Contract Sum.
 3. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
 4. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
 5. AIA Document G707-1994, "Consent of Surety to Final Payment."
 6. Evidence that claims have been settled.
 7. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request from Owner, Architect or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Name of Architect.
 4. Date.
 5. Name of Contractor.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.

- b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
- 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Software log with not less than the following:
- 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. Originator of the RFI (i.e. Contractor, Architect or Owner).
 - 6. RFI description.
 - 7. Date the RFI was submitted.
 - 8. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.7 PROJECT MEETINGS
- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Preparation of Record Documents.
 - l. Use of the premises and existing building.
 - m. Work restrictions.
 - n. Working hours.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management and recycling.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.
 - y. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written instructions.
 - l. Warranty requirements.

- m. Temporary facilities and controls.
 - n. Space and access limitations.
 - o. Regulations of authorities having jurisdiction.
 - p. Testing and inspecting requirements.
 - q. Required performance results.
 - r. Protection of adjacent work.
 - s. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's Construction Schedule.
 2. Construction schedule updating reports.
 3. Ghant Chart schedule requirements.
 4. Daily construction reports.
 5. Site condition reports.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 2. Predecessor Activity: An activity that precedes another activity in the network.
 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file.
 2. PDF file.

- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion .
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Uninterruptible services.
 - b. Use-of-premises restrictions.
 - c. Provisions for future construction.
 - d. Seasonal variations.
 - e. Environmental control.
 2. Work Stages: Indicate important stages of construction for each major portion of the Work.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- F. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule two days before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to

working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

- H. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.6 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 14 days of date established for commencement of the Work .
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.7 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. Approximate count of personnel at Project site.
 3. Equipment at Project site.
 4. Material deliveries.
 5. High and low temperatures and general weather conditions, including presence of rain or snow.
 6. Accidents.
 7. Meetings and significant decisions.
 8. Stoppages, delays, shortages, and losses.
 9. Meter readings and similar recordings.
 10. Emergency procedures.
 11. Orders and requests of authorities having jurisdiction.
 12. Change Orders received and implemented.
 13. Construction Change Directives received and implemented.
 14. Services connected and disconnected.
 15. Partial completions and occupancies.
 16. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

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SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos on CD-ROM or thumb-drive . Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in file metadata tag :
 - a. Name of Project.
 - b. Date photograph was taken.
 - c. Description of location, vantage point, and direction.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time from camera.
- D. File Names: Name media files with date and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points. .
1. Flag construction limits before taking construction photographs.
 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
1. Underground utilities.
 2. Underslab services.
 3. Piping.
 4. Electrical conduit.
 5. Waterproofing and weather-resistant barriers.
- D. Periodic Construction Photographs: Take 20 photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:

- a. Scheduled date for first submittal.
- b. Specification Section number and title.
- c. Submittal category: Action; informational.
- d. Name of subcontractor.
- e. Description of the Work covered.
- f. Scheduled date for Architect's final release or approval.
- g. Scheduled date of fabrication.
- h. Scheduled dates for purchasing.
- i. Scheduled dates for installation.
- j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Autodesk Revit model and exported AutoCAD drawings.
 - c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
 - 3) Architectural Drawing Files as requested..
 - 4) Consultant's participation will be at the discretion of the Consultant.
 - a) Structural drawings will not be provided.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 2. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Compliance with specified standards.
 - c. Notation of coordination requirements.
 - d. Notation of dimensions established by field measurement.
 - e. Relationship and attachment to adjoining construction clearly indicated.
 - f. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.

- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect and Owner will retain one each Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.

- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- I. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- J. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- K. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- M. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- N. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- O. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect's Submittal Transmittal Form that accompanies each submittal will appropriately indicate action.
 - 1. The Architect's signature will indicate that submittal(s) have been reviewed for the limited purpose of checking general conformance with information given, and the design concept expressed in the Contract Documents. This review was not conducted for the purpose of determining accuracy and completeness of other quantities, substantiating instructions for installation, assembly, performance of materials, equipment, systems, or construction means and methods -- all of which remain the responsibility of the Contractor. Reviewer remarks, if any, are attached.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 013324 - STRUCTURAL SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural submittals include shop drawings, diagrams, illustrations, schedules, performance charts, nomenclature charts, samples, brochures and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, fabricator, or distributor and which illustrate some portion of the Project.

1.2 RELATED SECTIONS

- A. Division 1 Sections

1.3 SUBMITTAL PROCEDURES

- A. Submittals shall be accompanied by a transmittal letter with the following information:
 - 1. Project name.
 - 2. Contractor's name.
 - 3. Date submitted.
 - 4. Description of items submitted; identify Work and product by Specification Section.
 - 5. Number of drawings and other pertinent data.
- B. Provide blank space on each submittal for the Architect/Structural Engineer's review stamp.
- C. The type and number of submittals for each item shall be in accordance with Section 013300.
- D. Contractor shall direct specific attention on the submittal to any deviation from the Construction Documents.

1.4 CONTRACTOR RESPONSIBILITY

- A. Contractor shall make all submittals in advance of installation or construction to allow the Architect/Structural Engineer sufficient time for review.
- B. Contractor shall review all submittals and shall stamp and sign each sheet of shop drawings and product data and sign each sample to certify compliance with requirements of Construction Documents. SUBMITTALS RECEIVED WITHOUT THE CONTRACTOR'S STAMP OF REVIEW WILL BE RETURNED TO THE CONTRACTOR FOR REVIEW AND RESUBMITTAL.
- C. Contractor shall understand that the submittal of the required documents does not constitute compliance with the requirements of the Construction Documents; only submittals reviewed by the Architect/Structural Engineer constitute compliance.
- D. It is the Contractor's responsibility to furnish equipment, materials, and labor for the Project which meets the requirements of the codes and authorities quoted as well as the Construction Documents. Proprietary items specified herein only establish a minimum functional and aesthetic

standard and it is incumbent upon the Contractor to ascertain conformance of these proprietary items or any proposed substitution with the codes and authorities.

- E. By reviewing, approving and submitting shop drawings, product data, or samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, member sizes catalog numbers, and similar data and that he has checked and coordinated shop drawings with the requirements of the Project and of the Construction Documents.
- F. Work requiring shop drawings, whether called for by the Construction Documents or requested by the Contractor, shall not commence until the Architect/Structural Engineer has reviewed the submission. Work may commence if the Contractor verifies the accuracy of the Architect/Structural Engineer's corrections and notations and complies with them without exception and without requesting change in Contract Sum or Contract Time.

1.5 ARCHITECT / STRUCTURAL ENGINEER REVIEW

- A. Architect/Structural Engineer will review submittals with reasonable promptness.
- B. Architect/Structural Engineer's review or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the Project and with the information given in the Construction Documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions.
- C. Architect/Structural Engineer's review shall not relieve the Contractor from responsibility for errors or omissions in the submittals.
- D. Architect/Structural Engineer's review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Construction Documents unless the Contractor has directed specific attention to the deviation at the time of submission and the Architect/Structural Engineer has given written approval to the specific deviation.
- E. Architect/Structural Engineer's review of submittals shall not be construed as authorizing any change in the Contract Sum or Contract Time.

1.6 SHOP DRAWINGS

- A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail of Construction Documents.
- B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Identify field dimensions; show relationship to adjacent or critical features of Work or products.
- D. A copy of the marked structural shop drawings with the Architect/Structural Engineer's review stamp is to be maintained at the job site.

1.7 PRODUCT DATA

- A. Submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information that is not applicable.
- C. Provide manufacturer's preparation, assembly, and installation instructions.

1.8 SAMPLES

- A. Submit full range of manufacturer's standard finishes, except where more restrictive requirements are specified, indicating colors, textures, and patterns.
- B. Submit samples to illustrate functional characteristics of products, including parts and attachments as required by Architect/Structural Engineer.
- C. Approved samples that are of proper size may be incorporated in Work.
- D. Label each sample with identification.
- E. Field Finishes: Provide full samples at Project, at location acceptable to Architect/Structural Engineer, as required by individual Specification Section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed Work.

1.9 RESUBMITTALS

- A. When submittals are returned to the Contractor with the Architect/Structural Engineer's corrections the Contractor shall make the required corrections. Upon request, resubmit one corrected set.
- B. Contractor shall direct specific attention on the resubmittal to all revisions including those requested by the Architect/Structural Engineer on previous submission.

1.10 DISTRIBUTION

- A. Distribute reproductions of shop drawings, copies of product data, and samples which bear the Architect/Structural Engineer's review stamp to job site file, Record Documents file, subcontractors, suppliers, other affected contractors, and other entities requiring information.
- B. Work shall be in accordance with and performed from the reviewed drawings.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION 013324

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.

- a. Include each system, assembly, component, and part of the exterior wall to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.
 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall have the same meaning as testing agency.
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict

and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Mockup Shop Drawings: For integrated exterior mockups.
 - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, telephone number, and email address of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.

8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Statement on condition of substrates and their acceptability for installation of product.
 2. Statement that products at Project site comply with requirements.
 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 5. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Statement that equipment complies with requirements.
 2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 3. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

- F. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329 ; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect , with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.
- I. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings . Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.

1.9 QUALITY CONTROL

- A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- B. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- C. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and for testing and inspection equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner , as indicated in the Statement of Special Inspections attached to this Section, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and authorities' having jurisdiction reference during normal working hours.
1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- C. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- D. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- E. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- F. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- G. "Provide": Furnish and install, complete and ready for the intended use.
- H. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
 1. ICC - International Code Council; www.iccsafe.org.
 2. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.
 1. EPA - Environmental Protection Agency; www.epa.gov.
 2. FG - Federal Government Publications; www.gpo.gov.
 3. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 4. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 014524 - STRUCTURAL SPECIAL INSPECTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section summarizes the responsibility of the Contractor and the Special Inspector in the performance of the special inspections required in the Construction Documents.
- B. Neither the observation of the Architect/Structural Engineer in the administration of the contract, nor tests/inspections by the Special Inspector, nor approvals by persons other than the Architect/Structural Engineer shall relieve the Contractor from his obligation to perform the Work in accordance with the Construction Documents.

1.2 RELATED SECTIONS

- A. Section 013324 - Structural Submittals.

1.3 REFERENCES

- A. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
- B. American Council of Independent Laboratories – Recommended Requirements for Independent Laboratories Qualifications.

1.4 SELECTION AND PAYMENT

- A. Contractor will employ and pay for the structural testing/inspection services that are required by the Construction Documents.
- B. Contractor shall pay for any additional structural testing/inspection required for Work or materials not complying with Construction Documents due to negligence or nonconformance.
- C. Contractor shall pay for any additional structural testing/inspection required for his convenience.

1.5 STRUCTURAL TESTING/INSPECTION REQUIREMENT SUMMARY

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings for the required tests/inspections.

1.6 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit name of Special Inspector, address, telephone number, fax number, and names and qualifications of technicians, inspectors, and engineers who will be working on this Project.
- B. If multiple Special Inspectors are used, submit the information stated above for each firm along with a statement of the testing/inspection responsibilities for each firm.

1.7 STRUCTURAL TESTING/INSPECTION AGENCY'S QUALIFICATIONS

- A. Provide inspectors qualified to perform special inspections as required by the Building Code and the Construction Documents.
 - 1. Inspectors shall have a minimum of two years' experience.
 - 2. Where required, the Inspectors shall be approved by the local building authority.
- B. Comply with the American Council of Independent Laboratories recommended requirements.
- C. Comply with ASTM E329.
- D. Maintain properly calibrated equipment; calibrated within the past 12 months with devices of accuracy traceable to either National Bureau of Standards (NBS) or accepted values of natural physical constants.
- E. Inspection of all field welding operations, including the installation of automatic end-welded stud shear connectors, shall be made by qualified welding inspectors. Such inspectors shall be persons trained and thoroughly experienced in inspecting welding operations. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the 1992 edition of AWS QCI, Standard and Guide for Qualification and Certification of Welding Inspectors published by the American Welding Society. Inspectors performing nondestructive testing shall be qualified in accordance with the American Society of Nondestructive Testing, Inc.

PART 2 MATERIALS

Not Used.

PART 3 EXECUTION

3.1 STRUCTURAL PRECONSTRUCTION MEETING

- A. A structural preconstruction meeting may be conducted at the construction site by the Structural Engineer to discuss quality issues. The parties involved may be the Architect, Contractor, Special Inspector, appropriate subcontractors, suppliers, and detailers.

3.2 SPECIAL INSPECTOR'S RESPONSIBILITIES

- A. Cooperate with the Contractor and provide timely service.
- B. Upon arriving at the construction site, sign in and notify the Contractor of presence.
- C. Select the representative samples that are to be tested/inspected.
- D. Perform tests/inspections as outlined in Construction Documents, the applicable codes, and as directed by the Structural Engineer.
- E. Report results of tests/inspections in accordance with the Construction Documents and the Building Code. Work and materials not complying with Construction Documents shall be immediately reported to the Contractor and Structural Engineer.

- F. Leave copies of field notes with the Contractor prior to leaving the construction site. Field notes shall include the message given to the Contractor, date, time of message, name of Contractor's representative informed, type and location of Work or materials tested/inspected, whether the work or materials complies with Construction Documents and name of the Structural Testing/Inspection Agency's representative.
- G. Report and distribute results of tests/inspections promptly in the form of written reports as directed by the Structural Engineer.
- H. Special Inspector shall not alter requirements of Construction Documents, approve or reject any portion of the Work, or perform duties of the Contractor.
- I. Submit written confirmation at end of construction that, to the best of their knowledge, the structural Work conforms to the Construction Documents.

3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Provide copy of Construction Documents to the Special Inspector.
- B. Arrange the preconstruction meeting to discuss quality issues.
- C. Notify the Special Inspector sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.
- D. Cooperate with Special Inspector and provide access to Work.
- E. Provide samples of materials to be tested in required quantities.
- F. Furnish copies of mill test reports when requested.
- G. Provide storage space for Special Inspector's exclusive use, such as for storing and curing concrete testing samples.
- H. Provide labor to assist the Special Inspector in performing tests/inspections.

3.4 OPTIONS

- A. If the Structural Testing/Inspection Agency is located at such a distance from the Project that travel expenses will be a consideration, or if the amount of sampling performed is minor, and by mutual agreement of the Architect/Structural Engineer and Contractor, the Contractor may be requested to take samples and forward them to the Structural Testing/Inspection Agency for testing/inspection.

END OF SECTION 014524

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

1.4 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.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to 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 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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

- A. 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.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Temporary 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. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
- G. 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.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Provide temporary offsite parking areas for construction personnel.
- D. Storage and Staging: Provide temporary offsite area for storage and staging needs.
- E. 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 or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - 3. Maintain and touch up signs so they are legible at all times.
- G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- H. 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.

I. Temporary Elevator Use: Use of elevators is not permitted .

J. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."

D. Stormwater Control: Comply with requirements of 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. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

G. Site Enclosure Fence: Before construction operations begin , furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations .

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

- 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 Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. 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 incomplete, insulate temporary enclosures.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 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 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard and replace stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.6 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. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.3 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.5 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
 6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with

requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.

- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 3. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 INFORMATIONAL SUBMITTALS

- A. Certified Surveys: Submit two copies signed by land surveyor .

- B. Certificates: Submit certificate signed by , certifying that location and elevation of improvements comply with requirements.

- C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.4 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb, and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.
- K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of Work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
 - 2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed .

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- A. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Facilitate recycling and salvage of materials.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Beyond salvage identified on the Drawings, the extent of recycling and salvage activity is at the Contractor's discretion.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 024119 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area off-site .
 - 5. Protect items from damage during transport and storage.

3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
 - C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 5. Submit testing, adjusting, and balancing records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF Electronic File: Architect will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial

Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit on digital media acceptable to Architect .
- D. Warranties in Paper Form:
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities including landscape development areas of rubbish, waste material, litter, and other foreign substances. Grassed areas intended for mowing shall be left mower ready

and cleared of loose rocks, dirt clods and other objects left over from construction progress.

- b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- c. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- d. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
- e. Vacuum and mop concrete.
- f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
- g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
- h. Remove labels that are not permanent.
- i. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- j. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- l. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
- m. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
- n. Clean strainers.
- o. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- p. Remove tools, construction equipment, machinery, and surplus material from Project site.
- q. Leave Project clean and ready for occupancy.

- C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction.

END OF SECTION 017700

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory manuals.
 2. Emergency manuals.
 3. Systems and equipment operation manuals.
 4. Systems and equipment maintenance manuals.
 5. Product maintenance manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
1. Submit twodrinter copies along with a pdf version to the Architect at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory Architect will return onecop of draft and mark whether general scope and content of manual are acceptable.
- C. Final Manual Submittal: Submit 2 copies of each manual in final form along with a pdf version 15 days before final completion. Architect will return copy with comments (if required) within 15 days after final inspection.
1. Correct or modify each manual to comply with Architect's comments. Submit 2 copies of each corrected manual along with a pdf version within 15 days of receipt of Architect's comments.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 2. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.6 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.7 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- C. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- D. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.8 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds, as described below.
- C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.
- H. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
- 1.9 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned Record Prints and three set(s) of file prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files and of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether

- individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.

- b. Date.
- c. Designation "PROJECT RECORD DRAWINGS."
- d. Name of Architect.
- e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders , Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file .

1.5 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders , Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file .
 - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.6 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
1. Instruction in operation and maintenance of systems, subsystems, and equipment.
 2. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
1. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 - 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.

- f. Safety procedures.
- g. Instructions on stopping.
- h. Normal shutdown instructions.
- i. Operating procedures for emergencies.
- j. Operating procedures for system, subsystem, or equipment failure.
- k. Seasonal and weekend operating instructions.
- l. Required sequences for electric or electronic systems.
- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner , through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site . Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.
 1. Submit video recordings on CD-ROM or thumb drive .
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
- E. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

DIVISION 02
EXISTING CONDITIONS

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 015639 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.
3. Section 017300 "Execution" for cutting and patching procedures.
4. Section 013516 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
5. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property , for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 CLOSEOUT SUBMITTALS

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.
- C. Sustainable Design Requirements for Building Reuse:

1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
2. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
3. Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video .
 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. 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 Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, 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.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

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

2. Store items in a secure area until delivery to Owner.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and 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, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075216 for new roofing requirements.
 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

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DIVISION 03
CONCRETE

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SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 01 Sections
- B. Section 032000 - Concrete Reinforcing.
- C. Section 033000 - Cast-in-Place Concrete.

1.2 REFERENCES

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Standard Specifications for Structural Concrete.

ACI 318 – Building Code Requirements for Structural Concrete.

ACI 347 – Guide to Formwork for Concrete.

ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

ASTM E1993 – Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

ASTM F1249 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

1.3 DEFINITIONS

- A. Architectural Concrete: All concrete members exposed to public view are classified as Architectural Concrete and shall comply with the Architectural Concrete provisions in this specification and ACI 301.

1.4 SUBMITTALS

- A. Submit locations of construction joints in framed construction for approval.
- B. Submit manufacturer's data for:
 - 1. Vapor Retarder

1.5 DESIGN OF FORMWORK

- A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.
- B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.
- C. Design formwork in a manner such that existing or new construction is not overloaded.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Form Material: Wood, plywood, metal, fiberglass or a combination of these, with sufficient strength to prevent distortion.
- B. Form Definitions
 - 1. Standard Forms: No form-facing material required. Standard forms are acceptable everywhere except for Architectural Concrete elements.

2.2 FORMWORK ACCESSORIES

- A. Formwork Accessories: Commercially manufactured products, including ties and hangers. Do not use nonfabricated wire form ties.

2.3 FORM RELEASE AGENT

- A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

2.4 VAPOR RETARDER

- A. Vapor Retarder
 - 1. Polyethylene sheet, not less than 10 mils thick, complying with ASTM E1745, Class A, B, and C.
 - 2. Maximum Permeance: ASTM E96: 0.04 perms (US).
 - 3. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive; minimum width of 4 inches.
 - 4. Pipe Boots: Construct pipe boots from vapor barrier material and seam tape in accordance with manufacturer's instructions.

2.5 EXPANSION / ISOLATION JOINT FILLER

- A. Expansion / Isolation Joint Filler: ASTM D1751, asphalt impregnated premolded fiberboard, 3/8-inch thick by full thickness of slab or joint, unless indicated otherwise in the Structural Drawings.

2.6 CONSTRUCTION JOINTS

- A. Slabs On Grade: Steel plate dowel (1/4" thick) such as manufactured by PNA Construction Technologies, Inc., Greenstreak Group, Inc., or approved equal.
 - 1. Plate Thickness: 1/4-inch thick for slabs up to 6 inches in thickness; 3/8-inch for slabs over 6 inches and up to 8 inches in thickness; 3/4-inch thick for slabs over 8 inches in thickness and up to 12 inches in thickness.

PART 3 EXECUTION

3.1 GENERAL

- A. Erect formwork in accordance with ACI 301 and ACI 347.
- B. Finished work shall comply with tolerances of ACI 117.
- C. Provide 3/4-inch chamfer at all formed corners.

3.2 FOUNDATION ELEMENTS

- A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.
- B. Sides of perimeter grade beams, foundation walls, and turned-down slabs shall be formed.
- C. Maintain minimum coverage of reinforcing steel as indicated in Structural Drawings.

3.3 VAPOR RETARDER

- A. Where indicated on Structural Drawings, place vapor retarder over granular subbase and behind expansion / isolation joints at walls. Place electrical conduits and ducts in granular subbase.
- B. Install vapor retarder in accordance with manufacturer's instructions and ASTM E1643.
 - 1. Lap vapor retarder six inches minimum at splices and seal with seam tape.
 - 2. Lap vapor retarder over footings and seal to walls.
 - 3. Seal all pipe penetrations with pipe boot.
 - 4. No penetration of vapor retarder is permitted except for reinforcing steel and permanent utilities.
 - 5. Do not puncture vapor retarder; repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides.

- C. Install waterproof and vaporproof membrane in accordance with manufacturer's recommendations.

3.4 FORM PREPARATION

- A. Seal form joints to prevent leakage.
- B. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.

- C. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

3.5 INSERTS AND EMBEDMENT ITEMS

- A. Install and secure in position required inserts, embeds, hangers, sleeves, anchors, and nailers.
- B. Locate anchor bolts/rods in position in accordance with approved setting drawings and secure to prevent displacement during concrete placement.

3.6 PROVISIONS FOR OTHER TRADES

- A. Install openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades requiring such items. Obtain approval from Structural Engineer for openings not shown in Structural Drawings.
- B. Accurately place and securely support items built into forms.

3.7 CONSTRUCTION JOINTS

- A. Slabs On Grade: Install steel plate dowels in accordance with manufacturer's recommendations. Place plate dowels at mid-depth of slab (+/-1/4-inch), unless noted otherwise in the Structural Drawings.
- B. Framed Construction:
 1. Install construction joints in accordance with ACI 318.
 2. Obtain Architect/Structural Engineer's prior approval for use and location of joints.
 3. Provide 1½-inch deep key-type construction joints at end of each placement for framed slabs, beams, walls, and footings. Bevel forms for easy removal.
 4. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

3.8 FORMWORK REMOVAL

- A. Remove formwork carefully in such manner and at such time as to ensure complete safety of structure. Do not remove formwork, shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.
- B. For conventionally reinforced framed slabs, formwork shall remain in place for a minimum of 5 days after concrete placement.

3.9 FINISHES OF FORMED SURFACES

- A. Standard Form Finish: Patch tie holes and defects. Chip or rub off fins exceeding ¼ inch in height. Leave surface with the texture imparted by the forms.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 031000 – Concrete Forming and Accessories.
- C. Section 033000 – Cast-in-Place Concrete.

1.2 REFERENCES

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Standard Specifications for Structural Concrete.

ACI 315 – Details and Detailing of Concrete Reinforcement.

ACI 318 – Building Code Requirements for Structural Concrete.

ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete Reinforcement.

ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

AWS D1.4 – Structural Weld Code - Reinforcing Steel.

AWS D12.1 – Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.

CRSI – Manual of Standard Practice.

1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Shop Drawings:
 - 1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.
 - 2. Indicate size, spacing, location and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.
 - 3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.

4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

C. Submit manufacturer's data for tension and compression splicers.

1.4 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.5 STORAGE AND PROTECTING

A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings that might impair bond.

PART 2 PRODUCTS

2.1 MATERIALS

A. Deformed Reinforcing Steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).

B. Welded Steel Wire Reinforcement: ASTM A1064.

2.2 ACCESSORY MATERIALS

A. Annealed Steel Tie Wire: 16½ gage minimum.

B. Bar Supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

2.3 SPLICERS

A. Tension Splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

B. Compression Splicers: Mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

2.4 DOWEL ADHESIVE

A. Adhesive conforming to Simpson AT-XP (IAPMO-UES ER-263), Simpson SET-XP (ICC-ES ESR-2508), DeWalt/Powers Pure110+ (ICC-ES ESR-3298), DeWalt/Powers DeWalt AC200+ Adhesive (ICC-ES ESR-4027), Hilti HIT-HY 200 Safe Set Fast Cure Adhesive (ICC-ES ESR-3187), Hilti HIT-RE 500 V3 SAFE Set Adhesive (ICC-ES ESR-3814). Minimum Embedment = 12 times anchor diameter, UNO.

PART 3 EXECUTION

3.1 FABRICATION

A. Fabricate reinforcing steel in accordance with ACI 318 and CRSI standards.

- B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.
- C. Weld only as indicated. Perform welding in accordance with AWS D1.4 and AWS D12.1.
- D. Tag reinforcing steel for easy identification.

3.2 INSTALLATION

- A. Before placing concrete, clean reinforcement of foreign particles and coatings.
- B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.
- C. Place concrete beam reinforcement support parallel to main reinforcement.
- D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.
- E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.
- F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

3.3 SPLICES

- A. Do not splice reinforcement except as indicated on Structural Drawings.
- B. Tension couplers may be used and installed in accordance with manufacturer's recommendations.

3.4 DOWELS IN EXISTING CONCRETE

- A. Install dowels and dowel adhesive in accordance with manufacturer's recommendations.
- B. Minimum embedment length into the existing concrete shall be 12 bar diameters, unless noted otherwise.

END OF SECTION 032000

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 031000 – Concrete Forming and Accessories.
- C. Section 032000 – Concrete Reinforcing.
- D. Section 036200 – Non-shrink Grouting.

1.2 REFERENCES

- A. The publications listed below form a part of this specification. The publications are referenced to within the text by the basic designation only.

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Specifications for Structural Concrete.

ACI 305.1 – Specification for Hot Weather Concreting.

ACI 306.1 – Standard Specification for Cold Weather Concreting.

ACI 308.1 – Specification for Curing Concrete.

ACI 311.6 – Specification for Testing Ready Mixed Concrete

ACI 311.7 – Specification for Inspection of Concrete Construction

ACI 318 – Building Code Requirements for Structural Concrete.

ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.

ASTM C33 – Standard Specification for Concrete Aggregates.

ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

ASTM C94 – Standard Specification for Ready-Mixed Concrete.

ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

ASTM C150 – Standard Specification for Portland Cement.

ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C469 – Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.

ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

ASTM C920 – Standard Specification for Elastomeric Joint Sealants

ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

ASTM E1155 – Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Submit three copies of the concrete mix designs. Include the following:
 - 1. Documentation of mix design proportions complying with ACI 301.
 - 2. Type and quantities of materials including admixtures
 - 3. Slump
 - 4. Air content
 - 5. Water/cement ratio
 - 6. Fresh unit weight
 - 7. Aggregates sieve analysis
 - 8. Design compressive strength
 - 9. Location of placement in structure
 - 10. Method of placement
 - 11. Method of concrete curing
 - 12. Method of protection of concrete
 - 12. Seven-day and 28-day compressive strengths
- C. Mix design submittals not conforming to the above will be rejected.

1.4 QUALITY ASSURANCE

- A. The ready-mixed concrete plant shall be certified for conformance with the requirements of the National Ready Mix Concrete Association.

- B. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

PART 2 PRODUCTS

2.1 CONCRETE MIX DESIGN

- A. Establish concrete mix design proportions in accordance with Article 4.2.3 of ACI 301.
- B. Concrete Strength: See Structural Notes in Structural Drawings.
- C. Slump
 - 1. Design concrete with a slump between four and ten inches.
 - 2. If a slump greater than five inches is desired, use a water reducer.
- D. Water/Cementitious Materials Ratio (w/cm): See Structural Notes in Structural Drawings.
- E. Entrained Air Content: See Structural Notes in Structural Drawings.
- F. Fresh Unit Weight
 - 1. Normal weight concrete: Fresh unit weight of 137 to 148 pcf.

2.2 MATERIALS

- A. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
- B. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
- C. Obtain aggregate from single source.
- D. Obtain each type of admixture from single source from single manufacturer.
- E. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer. Instructions and recommendations, published by the manufacturer of such materials are included in and are a part of these Specifications.

2.3 CEMENT

- A. Cement: Portland cement – ASTM C150.

2.4 FLY ASH

- A. Fly Ash: Class C or Class F – ASTM C618. When fly ash is used, the quantity shall be a minimum amount of 15 percent and a maximum amount of 25 percent by weight of the total cementitious materials, unless otherwise specified.

2.5 AGGREGATE

- A. Fine Aggregate: Fine aggregate complying with ASTM C33. Natural sand is preferred to manufactured sand.

- B. Fine Aggregate in slabs: The gradation of fine aggregate in concrete mix designs for floor slabs shall meet the requirements in the Table below:

Sieve Designation	Percent Passing	
	Normalweight Aggregate	Lightweight Aggregate
3/8 in.	100	100
No. 4	85 to 100	85 to 100
No. 8	80 to 90	–
No. 16	50 to 75	40 to 80
No. 30	30 to 50	30 to 65
No. 50	10 to 20	10 to 35
No. 100	2 to 5	5 to 20

- C. The weight of fine aggregate in the mix proportion shall not exceed 50 percent of the total weight of fine plus coarse aggregate.

- D. Coarse Aggregate: Washed gravel or crushed stone conforming to ASTM C33. When a single size or combinations of two or more sizes of coarse aggregates are used, the final grading shall conform to the grading requirements of ASTM C33, unless otherwise specified or permitted.

1. Unless governed by the maximum size as specified in Section 2 below, the largest practical-size coarse aggregate shall be used. Except for topping slabs 3-in. thick or less the largest size of coarse aggregate in normalweight concrete shall be a nominal $\frac{3}{4}$ -in. and the largest size of coarse aggregate in lightweight concrete shall be a nominal $\frac{1}{2}$ -in. For topping slabs that are 3-in. thick or less the maximum size of coarse aggregate shall be $\frac{3}{8}$ inch.

2. The nominal maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

2.6 WATER

- A. Water: Potable water

2.7 AIR ENTRAINING AGENT

- A. Air Entraining Agent: Air entraining agent shall conform with ASTM C260. For normalweight concrete air entrainment shall not be used in flatwork to receive a hard steel-troweled finish.

2.8 WATER REDUCER

- A. Water Reducer: Water reducing agent shall conform with ASTM C494.

2.9 ACCELERATORS

- A. Accelerators: Non-chloride accelerators shall conform with ASTM C494.

2.10 RETARDERS

- A. Retarders: Retarders shall conform with ASTM C494.

2.11 CHLORIDE

- A. Chlorides: Chlorides of any form shall not be used in concrete.

2.12 CURING COMPOUND

- A. Curing Compound: A water-based, VOC-compliant concrete curing agent, hardener, and dustproofer that complies with ASTM C309. The curing agent shall be residue-free and contains no wax, resin, or other materials that would inhibit the bond of subsequent coatings and/or treatments. An example of a curing compound that meets this specification is Med-Cure by W.R. Meadows. Coordinate curing compound with flooring supplier to ensure compatibility.

PART 3 EXECUTION

3.1 GENERAL

- A. Prepare place of deposit, mix, convey, and place in accordance with ACI 301 and ACI 304. If concrete is pumped, use a 5-inch minimum hose diameter, except for placement of metal pan stair treads where a 2-inch minimum hose is permitted.
- B. Wet forms before placing concrete.
- C. Deposit concrete continuously and as near as practical to final position.
- D. Deposit concrete in one layer or in multiple layers. Do not place fresh concrete against concrete that would result in cold joints.
- E. Do no flowing of concrete with vibrators.
- F. Do not place concrete over columns or walls until concrete in columns and walls has reached final setting.
- G. For cast-in-place floor systems place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at same time as concrete for adjacent slabs.
- H. Place and finish concrete members to comply with tolerances in ACI 117.
- I. Do not use aluminum equipment in placing and finishing concrete.
- J. Normalweight concrete for slabs to receive a hard-troweled finish shall not contain an air-entraining admixture or have a total air content greater than 3 percent.

3.2 SLABS-ON-GROUND

- A. Place concrete for slabs-on-ground on properly prepared granular subbase with vapor barrier.
- B. Place thickened slabs for partitions integral with floor slabs.

3.3 WATER REDUCERS

- A. Water reducers are to be added at dosage recommended by the manufacturer. The slump of the concrete shall be one to four inches at the time the water reducers are added. Do not permit fresh concrete containing superplasticizers to come in contact with fresh concrete not containing superplasticizers.

3.4 ADDITION OF WATER AT JOB SITE

- A. Water may be added at the jobsite if neither the maximum permissible water/cement ratio nor the maximum slump is exceeded. All concrete delivery trucks will have actual batch weight tickets available that clearly indicate the quantity of water that may be added at the jobsite that will not exceed the maximum water/cement ratio.

3.5 TIME LIMIT

- A. Deposit concrete within one and one-half hours after batching.

3.6 VIBRATION

- A. Consolidate concrete by vibration. Consolidate concrete around reinforcement, embedded items, and into corners of forms. Use immersion-type vibrators with nonmetallic heads for consolidating concrete around epoxy-coated or zinc and epoxy dual-coated reinforcing bars.
- B. Do not use vibrators to move concrete in a manner that will result in segregation.
- C. Spacing of immersion vibrator insertions shall not exceed 1-1/2 times the vibrator's radius of action in concrete being consolidated.

3.7 WEATHER PROVISIONS

- A. Do not place concrete while rain, sleet, or snow is falling unless protection is provided. Do not allow precipitation to increase mixing water or to damage concrete surface.
- B. Perform cold weather concreting in accordance with ACI 306. Concrete temperatures at delivery shall meet the requirements of Section 4 in ACI 301. Do not place concrete in contact with surfaces less than 35°F. Unless otherwise specified, this requirement shall not apply to reinforcing steel.
- C. Perform hot weather concreting in accordance with ACI 305. Unless otherwise specified, concrete temperature as placed shall meet the requirements of Section 4 of ACI 301. If temperature of reinforcement, embedments, or forms is greater than 120°F, use a fine mist of water to moisten and cool hot surfaces. Remove standing water before placing concrete.
- D. Protect concrete from drying and excessive temperature for the first seven days. Protect fresh concrete from wind.

3.8 CONTRACTION JOINTS

- A. Obtain Architect/Structural Engineer's approval for location of contraction joints. Do not use contraction joints in framed floors or composite slabs, unless noted in Structural Drawings.

- B. Unless noted otherwise in the architectural or structural drawings, provide contraction joints in slabs-on-ground to form a regular grid with a maximum spacing as noted in the Structural Drawings. The long dimension of the grid shall not exceed 1.5 times the short dimension of the grid. Contraction joints may be saw cut if cut within 24 hours after placement of concrete. Saw cuts shall be a depth equal to one-fourth the slab thickness by one-eighth inch wide. Alternately, contraction joints may be provided by preformed plastic strip inserts.
- C. Provide contraction joints in concrete walls at a maximum spacing of 20-ft. centers, or as noted in the Structural Drawings; coordinate location with Architect. Contraction joints shall be formed as a V-groove on both faces of the wall, 3/4-inch minimum depth.

3.9 CONSTRUCTION JOINTS

- A. Obtain Architect/Structural Engineer's approval for location of construction joints.
- B. Install construction joints in accordance with Section 2 in ACI 301. Remove laitance and thoroughly clean and dampen construction joints before placement of fresh concrete.
- C. Use an approved bonding agent applied in accordance with the manufacturer's requirements or portland-cement grout of the same proportions as the mortar in the concrete; or roughen the surface in an approved manner that exposes coarse aggregate and does not leave laitance, loosened aggregate particles, or damaged concrete at surface.

3.10 CONCRETE FINISHES

- A. Finish Concrete in accordance with ACI 301.
- B. After form removal, give each formed surface the specified finish. If the Architectural and Structural drawings do not specify a finish, provide a SF-1.0 finish on concrete surfaces not exposed to view and a SF-2.0 finish on concrete surfaces exposed to view.

- Surface Finish 1.0 (SF1.0)
1. No formwork facing material is specified
 2. Patch voids larger than 1-1/2 in. wide or 1/2 in. deep
 3. Remove projections larger than 1 in.
 4. Tie holes need not be patched
 5. Surface tolerance Class D as specified in ACI 117
 6. Mockup not required

- Surface Finish 2.0 (SF2.0)
1. Patch voids larger than 3/4 in. wide or 1/2 in. deep
 2. Remove projections larger than 1/4 in.
 3. Patch tie holes
 5. Surface tolerance Class B as specified in ACI 117
 6. Unless otherwise specified, provide mockup of concrete surface appearance and texture

- C. If a Rubbed Finish is specified in the Architectural or Structural drawings, produce the smooth-rubbed finish no later than the day following formwork removal. Wet the surface and rub it with an abrasive such as carborundum brick until uniform color and texture are produced. If insufficient cement paste can be drawn from the concrete itself by the rubbing process, use a grout made with cementitious materials from the same sources as used for in-place concrete.

- D. If a finish is not otherwise specified for the unformed surfaces the following finishes shall apply (Refer to Section 5 of ACI 301 for requirements of each finish):
1. Scratch finish—For surfaces intended to receive bonded cementitious or setting beds
 2. Float finish—For walks; steps; and for surfaces intended to receive waterproofing, roofing, insulation, or sand-bed terrazzo
 3. Trowel finish—For interior floors
 4. Broom finish—For parking slabs and exterior surfaces, including slabs, ramps, walkways, and steps, light broom finish for exterior balconies.
- C. Finish slabs to the following flatness and levelness tolerances:
1. F_F35/F_L25 minimum overall for composite of all measured values and F_F24/F_L15 minimum for any individual floor section.
 2. Slabs to receive wood flooring: F_F45/F_L30 minimum overall for composite of all measured values and F_F30/F_L20 minimum for any individual floor section.
 3. Architect/Structural Engineer will identify which sections of slabs are to be tested for flatness and levelness.
 - a. F_L values are applicable only if testing is performed within 72 hours of concrete placement, before tensioning of tendons, and before removal of formwork. F_L values are not applicable to unshored systems.
 - b. F_F values are applicable to all types of slab construction and are not subject to any time constraints.

3.14 CURING

- A. Begin curing procedures in accordance with Section 5 of ACI 301 immediately following the commencement of the finishing operation. If bleed water sheen is not visible on surface of concrete after strikeoff and initial bull floating, provide initial curing by means of fogging or application of evaporation retarder until final curing method is applied. Do not use fogging in cold weather concreting.
- B. After the initial curing outlined in A., apply the curing procedure as specified below. Apply curing in a manner that prevents marring, marking, or discoloration of finished surface. The curing methods below refer to ACI 301 (Specifications for Structural Concrete) and ACI 308.1 (Specification for Curing Concrete). The curing methods below are described in detail in these documents and the provisions of the curing method specified shall be adhered to. In addition, ACI 308 (Guide to External Curing of Concrete) may be used as a reference guide.
- C. Moist cure the unformed surface of all interior concrete slabs in accordance with ACI 301 and ACI 308 using either of the three methods below. The requirements for each of these curing methods can be found in Section 3 of ACI 308. Keep the concrete surface continually moist a minimum of 3 days. Do not allow the surface to dry or undergo cycles of drying and wetting.
1. Ponding
 2. Sprinkling
 3. Fogging
- D. If the concrete will be exposed with a polished or stained finish use curing water that is free of substances that will stain or discolor concrete. The staining ability of curing water can be evaluated by means of CRD-C 401.

- E. After the 3-day moist cure period, apply a membrane-forming curing compound in accordance with manufacturer's recommendations. The curing compound used must be compatible with all adhesives to be used on the concrete surface. Do not use a curing compound in areas to receive material that does not adhere to concrete cured with a curing compound.
- F. For formed surfaces, unless otherwise specified, if formwork is loosened or removed so that concrete surface is exposed to ambient air less than 7 days from concrete placement continue curing by either continuous fogging, ponding, continuous sprinkling, or a membrane-forming curing compound as described above and in ACI 301 and ACI 308.
- G. Maintain concrete temperature to prevent freezing of concrete and to ensure strength development. Unless otherwise specified, duration of thermal protection shall be at least 3 days.
- H. Maintain curing measures until the concrete has reached a minimum of 70 percent of the specified 28-day strength compressive strength, f'_c , but not less than 7 days.

3.15 CUTTING CONCRETE

- A. Obtain Architect/Structural Engineer's written approval prior to cutting concrete for installation of other work.

3.16 PATCHWORK AND REPAIRS

- A. Repair tie holes and other surface defects in formed finishes unless otherwise specified. Where the concrete surface will be textured by sandblasting or bush-hammering, repair surface defects before texturing.
- B. Notify Architect/Structural Engineer of any defective areas (other than tie holes) in concrete to be patched or repaired. Unless otherwise specified or permitted, repair surface defects by the following method. Outline repair area with a 1/2 in. deep saw cut and remove defective concrete down to sound concrete. Leave chipped edges perpendicular to the saw-cut surface or slightly undercut. Do not feather edges. Dampen the area to be patched plus 6 in. around the patch area perimeter. Prepare scrub coat mix using one-part portland cement and one-part sand by loose volume with water. Thoroughly brush scrub coat into the surface. When the scrub coat begins to lose water sheen, apply patching mortar (for concrete exposed to view, mortar shall match adjacent concrete color) and thoroughly consolidate mortar into place. Strike off mortar, finishing flush to the final surface. Leave the patch undisturbed for 1 hour before finishing. Keep the patch damp for 7 days.

END OF SECTION 033000

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SECTION 034500 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Architectural precast concrete counters .

1.2 DEFINITIONS

- A. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.3 ACTION SUBMITTALS

- A. Design Mixtures: For each precast concrete mixture. Include data on ratios of all materials in concrete mix.
- B. Shop Drawings:
 1. Detail fabrication and installation of architectural precast concrete units.
 2. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
 3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
- C. Samples: Design reference samples for initial verification of design intent, for each type of finish indicated on exposed surfaces of architectural precast concrete units, provide 1 full cast, representative of finish, color, and texture variations expected; approximately 48 by 12 by 2 inches.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

- A. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of one sample counter approximately 12' in length in area to be installed for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

1.6 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

- A. Deformed-Steel Welded Wire Reinforcement: ASTM A497/A497M, flat sheet.
- B. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type III, gray, unless otherwise indicated.
 - 1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Silica Fume: ASTM C1240, with optional chemical and physical requirement.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C33/C33M, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - a. Gradation: Uniformly graded .
 - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.
- D. Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.

2.3 GROUT MATERIALS

- A. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218/C1218M.

2.4 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.

- B. Limit use of fly ash and ground granulated blast-furnace slag to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.
- C. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
- D. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 117 when tested according to ASTM C1218/C1218M.
- E. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi minimum.
- F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

2.5 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.
- D. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
- E. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- F. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

- G. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- H. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
 - 1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- I. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 117.
 - 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.
- J. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- K. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that does not show in finished structure.
- L. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- M. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's approval.

2.6 FABRICATION TOLERANCES

- A. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.7 FINISHES

- A. Exposed faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved design reference sample [**mockups**] and as follows:
 - 1. As-Cast Surface Finish: Provide surfaces to match approved sample for acceptable surface, air voids, sand streaks, and honeycomb.
- B. Finish exposed top and side surfaces of architectural precast concrete units to match face-surface finish.

- C. Finish exposed top and side surfaces of architectural precast concrete units with smooth, steel-trowel finish.
- D. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
- B. Install architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 2. Unless otherwise indicated, maintain uniform joint widths of 1/8 inch.
- C. Connect architectural precast concrete units in position by grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
- D. Grouting or Dry-Packing Connections and Joints: Grout connections where required or indicated. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.

3.2 ERECTION TOLERANCES

- A. Erect architectural precast concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.

3.4 REPAIRS

- A. Repair architectural precast concrete units if permitted by Architect. Architect reserves the right to reject repaired units that do not comply with requirements.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 5 feet.
- C. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.5 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

DIVISION 04

MASONRY

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SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Pre-faced concrete masonry units.
4. Concrete face brick.
5. Building (common) brick.

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.
- C. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties .
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample panels for typical exterior wall in sizes approximately 60 inches long by 48 inches high by full thickness.

1.6 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. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 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 C90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi .
 - 2. Density Classification: Lightweight unless otherwise indicated.

2.3 CONCRETE LINTELS

- A. Concrete Lintels: ASTM C1623, 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 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

- B. Clay Face Brick: Facing brick complying with ASTM C216 .

1. Grade: SW .
2. Type: FBS .
3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi .
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67.
5. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
6. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing according to ASTM C67 with no observable difference in the applied finish when viewed from 10 feet .
7. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
8. Size (Actual Dimensions): 3-1/2 inches wide by 2-3/4 inches high by 7-1/2 inches long or 3-5/8 inches wide by 2-13/16 inches high by 7-5/8 inches long.
9. Size (Actual Dimensions): 3-1/2 inches wide by 3-1/2 inches high by 7-1/2 inches long or 3-5/8 inches wide by 3-5/8 inches high by 7-5/8 inches long.
10. Size (Actual Dimensions): 3-1/2 inches wide by 7-1/2 inches high by 7-1/2 inches long or 3-5/8 inches wide by 7-5/8 inches high by 7-5/8 inches long.

- C. Building (Common) Brick: ASTM C62, Grade SW .

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi .
2. Size: Match size of face brick.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

- B. Hydrated Lime: ASTM C207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Cemex S.A.B. de C.V.
 - Holcim (US) Inc.
 - Lafarge North America Inc.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- Euclid Chemical Company (The); an RPM company.
- F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Colored Portland Cement-Lime Mix:
- Manufacturers: Subject to compliance with requirements, provide products by the following:
 - Lafarge North America Inc.
2. Colored Masonry Cement:
- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Cemex S.A.B. de C.V.
 - Holcim (US) Inc.
 - Lafarge North America Inc.
- G. Aggregate for Mortar: ASTM C144.
- For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - White-Mortar Aggregates: Natural white sand or crushed white stone.
 - Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C404.
- I. Water: Potable.

2.6 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 .
- B. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Hot-dip galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon steel.
 3. Wire Size for Side Rods: 0.148-inch diameter.
 4. Wire Size for Cross Rods: 0.148-inch diameter.
 5. Wire Size for Veneer Ties: 0.148-inch diameter.
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 7. Provide in lengths of not less than 10 feet , with prefabricated corner and tee units.
- C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.
- D. Masonry-Joint Reinforcement for Multiwythe Masonry:
1. Ladder type with one side rod at each face shell of hollow masonry units more than 4 inches wide, plus one side rod at each wythe of masonry 4 inches wide or less.
 2. Tab type, either ladder or truss design, with one side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe, but with at least 5/8-inch cover on outside face.
 3. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches . Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
- E. Masonry-Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch- diameter, hot-dip galvanized carbon steel continuous wire.

2.7 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized-steel wire.
- D. 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- diameter, hot-dip galvanized-steel wire.
 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.

- E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- thick steel sheet, galvanized after fabrication
 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized-steel wire.
- F. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M .
- H. Adjustable Masonry-Veneer Anchors:
1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch .
 2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick steel sheet, galvanized after fabrication .
 3. Fabricate wire ties from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
 4. Coated, Steel Drill Screws for Steel Studs: ASTM C954 except with hex washer head and neoprene or EPDM washer, No. 10 diameter, and with coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B117.

2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
 2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
 3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet . Provide splice plates at joints of formed, smooth metal flashing.
 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 5. Fabricate metal expansion-joint strips from stainless steel or copper to shapes indicated.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advanced Building Products Inc.
 - 2) Hohmann & Barnard, Inc.

- 3) York Manufacturing, Inc.
 2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch .
 - 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) Advanced Building Products Inc.
 - 2) Grace Construction Products, a unit of W.R. Grace & Co.
 - 3) Heckmann Building Products, Inc.
 - 4) Hohmann & Barnard, Inc.
 - 5) W.R. Meadows, Inc.
 - C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
 - D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- 2.9 MISCELLANEOUS MASONRY ACCESSORIES
- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
 - B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
 - C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).
 - D. Weep/Cavity Vent Products: Use the following unless otherwise indicated:
 1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advanced Building Products Inc.
 - 2) CavClear/Archovations, Inc.
 - 3) Hohmann & Barnard, Inc.
 - E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advanced Building Products Inc.
 - b. Heckmann Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
 - d. Wire-Bond.

2. Configuration: Provide one of the following:
 - a. Strips, full depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.
 - b. Strips, not less than 3/4 inch thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
 - c. Sheets or strips full depth of cavity and installed to full height of cavity.
 - d. Sheets or strips not less than 3/4 inch thick and installed to full height of cavity, with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from clogging with mortar.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. PROSOCO, Inc.

2.11 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 or masonry cement mortar unless otherwise indicated.
 3. For exterior masonry, use portland cement-lime or masonry cement mortar.
 4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, 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 M.
 2. For reinforced masonry, use Type M or Type S .
 3. For mortar parge coats, use Type S or Type N.
 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
 2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 3. Mix to match Architect's sample.
 4. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.
 - c. Concrete face brick.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match Architect's sample.
 2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
 - b. Pre-faced CMUs.
 - c. Concrete face brick.
- F. Grout for Unit Masonry: Comply with ASTM C476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi .
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 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.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

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

B. Lines and Levels:

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

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch , with a maximum thickness limited to 1/2 inch .
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch .
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch .

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

3.4 MORTAR BEDDING AND JOINTING

- A. Lay 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 masonry units 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. Lay structural clay tile as follows:
1. Lay vertical-cell units with full head joints unless otherwise indicated. Provide bed joints with full mortar coverage on face shells and webs.
 2. Lay horizontal-cell units with full bed joints unless otherwise indicated. Keep drainage channels, if any, free of mortar. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position. Butter both sides of units to be placed, or butter one side of unit already in place and one side of unit to be placed.
 3. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment. If not indicated, lay walls with 1/4- to 3/8-inch- thick joints.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods :
1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
 2. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes .
 - b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement to allow for differential movement regardless of whether bed joints align.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

- C. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.
- D. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches .
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- 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.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.8 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches , and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
 3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
 2. Space weep holes 24 inches o.c. unless otherwise indicated.
 3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- E. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.9 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches .

3.10 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. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 3. Protect adjacent surfaces from contact with cleaner.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.11 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

DIVISION 05

METALS

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SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 052100 – Steel Joist Framing.
- C. Section 053100 – Steel Decking.

1.2 REFERENCES

AISC – Steel Construction Manual, 14th Edition.

AISC 303 – Code of Standard Practice for Steel Buildings and Bridges.

AISC 341-10 – Seismic Provisions for Structural Steel Buildings dated June 22, 2010.

AISC 360-10 – Specification for Structural Steel Buildings.

AISC – Specification for Structural Joints Using ASTM A325 or A490 Bolts prepared by the Research Council on Structural Connections.

AWS D1.1 – Structural Welding Code.

AWS A5.1 – Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.

AWS A5.5 – Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.

AWS A5.17 – Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.

AWS A5.20 – Carbon Steel Electrodes for Flux Cored Arc Welding.

SSPC – Steel Structures Painting Manual.

ASTM A6 – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

ASTM A36 – Standard Specification for Carbon Structural Steel.

ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A108 – Standard Specification for steel Bar, Carbon and Alloy, Cold-Finished.

ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.

ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 KSI Minimum Tensile Strength.

ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

ASTM A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

ASTM A563 – Standard Specification for Carbons and Alloy Steel Nuts

ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium Vanadium Structural Steel.

ASTM A673 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel

ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

ASTM A992 – Standard Specification for Structural Steel Shapes.

ASTM A1085 – Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)

ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

ASTM F436 – Standard Specification for Hardened Steel Washers.

ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-Ksi Yield Strength.

ASTM F1852 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

ASTM F2280 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Shop Drawings:
 - 1. Contact Structural Engineer's Construction Administrator prior to detailing structural steel shop drawings.
 - 2. Shop drawings shall be submitted on a 24" x 36" sheet minimum.
 - 3. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacing and locations of structural steel members, including connections, attachments, anchorages, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the stud shear connectors and headed studs.
 - 4. Beam sizes shall be shown on the erection drawings (plans).
 - 5. Submit shop drawings for review.
 - 6. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Maintain at construction office written welding procedures for each type of welded joint used in accordance with AWS D1.1.
- D. Submit certification that the fabricator meets the required qualifications and ultrasonic testing reports for complete penetration welds. If fabricator has an independent testing agency inspect fabrication as required by these specifications, submit the name and qualifications of the independent testing agency.
- E. Upon request, submit the erection sequence and procedures to be used by the steel erector.

1.4 QUALITY ASSURANCE

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

1.5 STORAGE

- A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

1.6 FABRICATOR'S QUALIFICATIONS

- A. Steel fabricator shall meet the requirements in the Structural Quality Assurance Plan in the Structural Drawings.

1.7 ERECTOR'S QUALIFICATIONS

- A. Steel fabricator shall meet the requirements in the Structural Quality Assurance Plan in the Structural Drawings
- B. Erector shall be experienced in erecting structural systems similar in complexity to this Project as evidenced by 10 completed projects.
- C. Erector shall have a minimum of 5 years experience in the erection of structural steel or is an AISC Certified Advanced Steel Erector.

- D. For qualification of welders, refer to the Structural Quality Assurance Plan in the Structural Drawings.

PART 2 PRODUCTS

2.1 ANCHOR RODS

- A. Anchor Rods: Headed rod or a threaded rod with a heavy hexagonal nut and plate washer welded to the bottom of the threaded rod conforming to ASTM F1554.
- B. Nuts and Washers: Two hexagonal nuts and two plate washers conforming to ASTM A36 for each anchor rod assembly.

2.2 ROLLED STEEL SHAPES, PLATES, AND BARS

- A. Rolled Steel Shapes, Plates, and Bars: ASTM A36; ASTM A572, Grade 50; or ASTM A992 as indicated by the Structural Drawings. ASTM A572, Grade 50 may be substituted for ASTM A992.

2.3 SQUARE, RECTANGULAR AND ROUND STEEL HOLLOW STRUCTURAL SECTIONS (HSS)

- A. Hollow structural sections:
 - 1. Rectangular and Square: ASTM A500 Grade B, 46 ksi minimum yield strength
 - 2. Round: ASTM A500 Grade B, 42 ksi minimum yield strength

2.4 PIPE STEEL STRUCTURAL SECTIONS

- A. Pipe Structural Sections: ASTM A53, Gr. B, 35 ksi minimum yield strength.

2.5 NON-HIGH-STRENGTH FASTENERS

- A. Non-High-Strength Bolts: ASTM A307, Grade A, 60 ksi minimum, where noted on the Structural Drawings.
- B. Hardened Steel Washers: ASTM F436.

2.6 HIGH-STRENGTH FASTENERS

- A. High-Strength Bolts: ASTM A325 or ASTM A490 as noted on the Structural Drawings. 3/4-inch minimum diameter.
- B. Hardened steel washers shall conform to ASTM F436.
- C. Spline-Type Tension Control Bolts: ASTM spline-type tension control bolts with plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.
- D. Do not use load indicating washers.

2.7 EXPANSION ANCHORS

- A. Expansion Anchors: See Structural Notes.

2.8 ADHESIVE ANCHORS

- A. Adhesive Anchors: See Structural Notes.

2.9 SCREW ANCHORS

- A. Screw Anchors: See Structural Notes.

2.10 HEADED STUDS

- A. Headed Studs: ASTM A108, comply with AWS D1.1. Provide studs with the diameter shown on the Structural Drawings.

2.11 STUD SHEAR CONNECTORS

- A. Stud Shear Connectors: ASTM A108, 3/4-inch diameter in compliance with AWS D1.1.

2.12 WELD ELECTRODES

- A. Weld Electrodes: AWS A5.1, A5.5, A5.17, or A5.20 E-70 series low hydrogen electrodes.
- B. Provide E-70 series, low hydrogen electrodes with a minimum Charpy V-Notch (CVN) toughness of 20 ft.-lb. at 0 degrees Fahrenheit and 40 ft.-lb. at 70 degrees Fahrenheit for demand critical welds. Refer to the Structural Drawings for locations of demand critical welds.
- C. Properly store electrodes to maintain flux quality.

2.13 PAINT

- A. Oxide Primer: AISC Specifications, Code of Standard Practice, and SSPC Steel Structure Painting Manual, unless indicated otherwise.
- B. Paint Primer: Free of lead and chromate and comply with State and Federal volatile organic compound (VOC) requirements.
- C. Paint Primer: Compatible with finish coating.

2.14 GALVANIZE

- A. Galvanized Coating: ASTM A123.
- B. Galvanize Bolts, Nuts, and Washers: ASTM A153 when used to connect steel members that are specified to be galvanized.
- C. Expansion Anchors, Adhesive Anchors, or Screw Anchors: Where specified to be galvanized, anchors shall be mechanically galvanized in accordance with ASTM B695, Class 65, Type I.

PART 3 EXECUTION

3.1 GENERAL

- A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.
- B. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

3.2 ANCHOR ROD SETTING

- A. Provide templates for setting anchor rods. Position anchor rods by using templates with two nuts to secure in place prior to placement of concrete.
- B. Do not erect steel where anchor rod nuts will not have full threads.

3.3 CONNECTIONS

- A. Provide a minimum of two fasteners at each bolted connection.
- B. Ensure fasteners are lubricated prior to installation.
- C. Provide high-strength bolted connections in accordance with AISC Specifications for Structural Joints using ASTM A325 or A490 Bolts.
- D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

3.4 FASTENER INSTALLATION

- A. Bolts shall be installed in holes of the connection and brought to snug tight condition. Tighten connection progressing systematically from the most rigid part to the free edges of the connection to minimize relaxation of the bolts.
- B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.
- C. Installation and tightening of bolts shall conform to the AISC Specifications for Structural Joints.

3.5 EXPANSION ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.
- B. Minimum Embedment: See Structural Notes on Drawings.

3.6 ADHESIVE ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR or IAPMO-UES report for the particular anchor used.
- B. Minimum Embedment: See Structural Notes on Drawings.

3.7 SCREW ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.
- B. Minimum Embedment: See Structural Notes on Drawings.

3.8 HEADED STUDS

- A. Headed studs shall be installed in accordance with AWS D1.1 with the resulting in-place length after burn-off as shown on the Structural Drawings.
- B. Do not locate headed studs closer than 1-1/4 inches from the edge of embedded steel member to the centerline of the stud.
- C. Remove ceramic arc shields after welding studs.

3.9 WELDING

- A. Comply with AWS D1.1. Use prequalified weld procedures.
- B. Provide end returns where fillet welds terminate at ends or sides. Returns shall be continuous for a distance of not less than two times the nominal size of the weld.
- C. Complete penetration joints shall be backgouged to sound metal before the second side is welded or have 1/4-inch root opening with 3/16 x 1 inch backing bar. Access holes are required. Filling access holes is not required.
- D. Remove all slag and weld splatter from deposited weld metal.

3.10 SPLICING

- A. Splice members only where indicated unless authorized in writing by Structural Engineer.
- B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

3.11 CUTTING

- A. Do not use flame cutting to correct errors unless authorized in writing.
- B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

3.12 MILL SCALE

- A. Remove loose mill scale.

3.13 BOLT HOLES

- A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

3.14 PAINTING

- A. Paint steel that is not encased in concrete, plaster, or sprayed fireproofing. Do not shop paint in areas to be field welded, contact surfaces of slip critical connections, or areas to receive special finishes.
- B. Field paint as required steel that has been welded or that is unpainted after connections have been tightened.

3.15 GALVANIZING

- A. Galvanize shelf angles that support the exterior building veneer, for example brick shelf angles.
- B. Galvanize environmentally exposed steel, for example mechanical equipment supports.
- C. Touch-up welds and abrasions in galvanized members in accordance with ASTM A780.

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior non-load-bearing wall framing.

1.2 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association the Steel Stud Manufacturers Association or the Supreme Steel Framing System Association.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and ASTM C955 .

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Framing Members, General: Comply with ASTM C955 for conditions indicated.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0329 inch .
 2. Flange Width: 1-3/8 inches .
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Metal Hat Channel: Manufacturer's standard F-Shaped Steel Track, of web depths indicated, unpunched, with base gauge of 25.

2.5 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch .
 - 2. Flange Width: 1-3/8 inches 2 inches .
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Metal Hat Channel: Manufacturer's standard F-Shaped Steel Track, of web depths indicated, unpunched, with base gauge of 25.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, , threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C .
- C. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.8 MISCELLANEOUS MATERIALS

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- H. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.3 INSTALLATION OF INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches or As indicated on Drawings .
 - C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
 - D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to studs and anchor to building structure.
 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
 - E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 1. Install solid blocking at 96-inch centers .
 - G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- 3.4 INSTALLATION TOLERANCES
- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.
- 3.5 REPAIRS
- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- 3.6 FIELD QUALITY CONTROL
- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - B. Field and shop welds will be subject to testing and inspecting.

- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 054000

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SECTION 054100 - COLD-FORMED EXTERIOR STEEL STUD FRAMING

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 1 Sections.

1.2 REFERENCES

AISI S100-07 – North American Specification for the Design of Cold-Form Steel Structural Members.

AISI S200-07 – North American Standard for Cold-formed Steel Framing – General Provisions.

ANSI Z49.1 – Safety in Welding, Cutting, and Allied Processes.

ASTM A653 – Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

AWS D1.3 – Structural Welding Code: Sheet Steel.

SSMA – Steel Stud Manufacturers Association Product Technical Information.

1.3 DESIGN REQUIREMENTS

- A. Design of the following is the sole responsibility of the Contractor:
 - 1. Cold-formed exterior steel studs including tracks, bridging, and window or door framing.
 - 2. Any required temporary and permanent restraint/bracing.
- B. Cold-formed exterior steel stud framing shall be designed by a Structural Engineer licensed in the Project state. Design criteria includes, but not limited to, the following:
 - 1. Deflection of steel studs shall not exceed $L/600$.
 - 2. Wind pressure for Components and Cladding as indicated in the Structural Drawings.
- C. Cold-formed steel design, fabrication and erection shall conform to AISI S100 and AISI S200.
- D. Stud depth, layout and configuration of cold-formed exterior steel studs shall be compatible with the plans, sections, and details of the Construction Documents.

1.4 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Shop Drawings
 - 1. Shall include but not necessarily be limited to the following:

- a. Plans, cross-sections, or elevations as necessary to adequately depict component locations.
 - b. Framing details at wall openings including jamb members, headers, sills, and connections.
 - c. Connection details showing screw types and locations, weld lengths or other fastener requirements.
 - d. Bracing locations and details. Any required bracing to the primary structure that is not shown in the Construction Documents shall be specifically identified.
2. Design loads.
 3. Shall be sealed by an Engineer licensed in the Project state.
- C. Submit manufacturer's product information clearly describing quality, performance and finish for steel studs.
- D. Submit manufacturer and Installer qualifications.

1.5 QUALITY ASSURANCE

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.
- B. Manufacturer shall have a minimum of three years documented experience in the manufacturing of products required by the Construction Documents.
- C. Installer shall have a minimum of three years documented experience.

1.6 MOCKUP

- A. Provide a minimum of one mockup of exterior wall framing sufficient in size to illustrate various construction conditions and as directed by the Architect. Construct mock-up to include, but not be limited to, the following components:
 1. Stud framing, including runners, bridging, outlet box framing and other framing accessories. Include interior and exterior corner conditions, and intersections with interior rated stud walls.
 2. Typical window frame, door frame and expansion joint.
 3. Insulation, sheathing and vapor retarder. Install sheathing with veneer anchors to receive subsequent veneer mock-up.
- B. The approved sample will serve as the standard of quality, as well as for coordination with related components.
- C. Leave approved mock-up ready to receive exterior insulation and finish system mock-up.
- D. Do not place mock-up to remain as a part of the Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Studs and accessories which are 12, 14, or 16 gage shall meet the requirements of ASTM A446, Grade D with a minimum yield of 50,000 psi. Studs and accessories which are 18 or 20 gage shall meet the requirements of ASTM A446, Grade A with a minimum yield of 33,000 psi.

- B. Studs and accessories shall have a G60 galvanized coating meeting the requirements of ASTM A525.

2.2 ACCESSORIES

- A. Bridging: 1-1/2-inch deep by 16 gage minimum.
- B. Strap Bracing: Minimum of 1-1/2-inch wide by 18 gage unless noted otherwise.
- C. Tracks: Deep leg type, unpunched, same gage, size, and finish as studs with minimum 18 gage thickness.
- D. Compensation Tracks / Slip Tracks: Deep leg type with a flange width of 2½ inches. Track shall be same nominal depth as stud/track with allowance for slip of standard deep leg track. Minimum 14 gage.
- E. Plates, Gussets, Clip Angles: Minimum 14 gage. Clip angles shall be a minimum of 2 inches x 2 inches.
- F. Self-drilling, Self-tapping Screws: Hot-dip galvanized conforming to values given in the referenced SSMA document.
- G. Anchorage Devices:
 - 1. Powder Actuated Fasteners shall be manufactured from AISI 1062 or AISI 1065 steel austempered to a minimum core hardness of 50-54Rc and possess the following properties:
 - Tensile strength = 270,000 psi
 - Shear strength = 162,000 psi
 - All fasteners shall meet the requirements of ASTM B-633-78.
 - Fasteners shall be a minimum 9/64-inch diameter.
 - Fasteners shall be zinc plated.
 - Fastener minimum design values shall be in accordance with manufacturer's recommendations.
 - 2. Expansion anchors shall be stud type, and shall be zinc plated in accordance with ASTM B633, Type III Fe/Zn 5. Expansion anchors shall be a minimum of 3/8-inch diameter with 2-1/2-inch embedment into concrete unless noted otherwise in the Drawings.
- H. Welding: AWS D1.3-8 Structural Welding Code-Sheet Metal (field welding of material shall not be permitted for 20 gage material or thinner).
- I. Acoustical Sealant: USG, or approved equal.
- J. Sizes and thicknesses are minimum acceptable, regardless of load. Actual sizes shall be determined by Steel Stud manufacturer in accordance with loads given in the Structural Notes. Minimum listed size shall not be construed to be the actual designed component size.

PART 3 EXECUTION

3.1 ERECTION

- A. General:

1. Framing components shall be cut squarely for attachment to perpendicular members or, as required, for angular fit against abutting members.
 2. Erect framing plumb, level, and square.
 3. Studs shall be plumbed, aligned, and securely attached to the flanges or web of both the upper and lower tracks.
 4. Fastening of components shall be with self-drilling screws or welds. Wire tying of components shall not be permitted. Touch-up field welds and scratched or damaged finish to studs with zinc rich paint.
 5. Splices in framing components shall not be permitted other than in runner tracks.
 6. Runner tracks shall be securely anchored to the supporting structure.
- B. Studs Spacing: Stud manufacturer shall determine stud spacing at interior and corner zones to resist Component and Cladding Loads given in the Structural Notes. Stud spacing shall not exceed 16 inches, center-to-center, regardless of design loads.
- C. Stud Tracks: Before installing stud tracks for exterior walls, apply two 1/2- inch round beads of acoustical sealant longitudinally under stud tracks to seal runner to floor.
- D. Door Openings: Install multiple studs each side of door openings as shown on the approved Shop Drawings.
1. Install headers between door jambs at top of doors as shown on the approved Shop Drawings.
 2. On top of headers, install runners to receive bottom ends of studs over door openings.
- E. Window Openings: Install multiple studs each side of window openings as shown on the approved Shop Drawings.
1. Install headers and sills between window jambs shown on the approved Shop Drawings.
 2. On top of headers and bottom of sills, install runners to receive short studs.
 3. Where shown on the Architectural Drawings, attach wood blocking to stud framing with 1/2-inch diameter galvanized bolts 12 inches on-center. Coordinate attachment of window system to blocking/stud framing prior to erection of metal stud framing.
 4. Where indicated on the Structural Drawings (for example, at windows over 8 feet wide and at cantilevered parapets), attach studs / track to structural steel reinforcement with self-drilling screws.
- F. Corners: Construct using a minimum of three studs designed to resist the design loads.
- G. Between Studs: Install framing for attachment of electrical boxes, mechanical and for other items to be anchored to walls.
- H. At Butting Walls: Place studs not more than 2 inches from walls.
- I. Insulation: In all multiple jamb studs and multiple headers not accessible to insulation contractors, insulation equal to that specified elsewhere shall be provided.

END OF SECTION 054100

DIVISION 06
WOOD, PLASTIC AND COMPOSITES

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SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Section 062000 – Finished Carpentry.

1.2 REFERENCES

AF&PA – National Design Specification for Wood Construction with 2005 Supplement.

ALSC – American Lumber Standards Committee: Softwood Lumber Standards.

ANSI A208.1 – Mat-Formed Wood Particleboard.

ANSI/AHA A135.4 – Basic Hardboard.

APA – American Plywood Association.

ASTM D2559 – Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.

ASTM D3498 – Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.

AWPA C1 – All Timber Products Preservative Treatment by Pressure Process.

AWPA C2 – Lumber, Timber, Bridge Ties and Mine Ties – Preservative Treatment by Pressure Process.

AWPA C9 – Plywood - Preservative Treatment by Pressure Process.

AWPA C20 – Structural Lumber Fire-Retardant Treatment by Pressure Process.

AWPA C27 – Plywood – Fire-Retardant Treatment by Pressure Process.

PS 2 – Performance Standard for Wood-Based Structural-Use Panels.

PS 20 – American Softwood Lumber Standard

SPIB – Southern Pine Inspection Bureau.

WCLIB – West Coast Lumber Inspection Bureau.

WWPA – Western Wood Products Association.

1.3 DEFINITIONS

- A. Structural panels are all-veneer plywood, composite panels containing a combination of veneer and wood-based material, or mat-formed panels such as oriented strand board and waferboard.

1.4 SUBMITTALS

- A. For treated materials, submit certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
- B. For all dimensioned lumber, submit letters of certificate stating the species and grade of lumber used.
- C. For all structural sheathing, submit letters of certificate stating the structural panels meet specified requirements.
- D. Submit product data for metal framing anchors, connectors, and construction adhesives.

1.5 QUALITY ASSURANCE

- A. Comply with National Design Specification For Wood Construction.
- B. Perform Work in accordance with the following agencies:
 - 1. Lumber Grading Agency: Certified by ALSC.
 - 2. Plywood Grading Agency: Certified by APA.
- C. Identify all wood products by official grade mark, except for wood products exposed to view submit manufacturer's certificate that lumber meets specified requirements.
 - 1. Lumber: Grade stamp to contain symbol of inspection agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
 - 2. Structural Panel: Panel grade, span rating, exposure durability classification, product standard thickness, and mill number.
- D. Structural Testing/Inspection Agency shall perform the following quality related items:
 - 1. Verify spacing, size, grade, and species of wood members.
 - 2. Verify attachment pattern, construction adhesive (if applicable) and orientation of structural panels.
 - 3. Verify shear wall hold-down size, installation, and locations.
 - 4. Verify exterior wall and shear wall sill plate attachment.
 - 5. Verify anchorage and connection details of beams and headers.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle all materials in such a manner to protect against damage and the weather.
- B. Protect the installed work and materials of all other trades.

- C. In the advent of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 LUMBER

- A. Lumber: Solid sawn and finger-jointed lumber manufactured to comply with PS 20 "American Softwood Lumber Standards" and with the applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Broad of Review listed:
 - 1. Redwood Inspection Service.(RIS).
 - 2. Southern Pine Inspection Bureau (SPIB).
 - 3. West Coast Lumber Inspection Bureau (WCLIB).
 - 4. Western Wood Products Association (WWPA).
 - 5. National Lumber Grades Authority (NLGA – Canadian)
- B. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual size as required by PS 20, for moisture content specified for each use.
- C. Dressed lumber: S4S, unless otherwise indicated.
- D. Moisture Content: Seasoned lumber, 15% maximum moisture content at time of dressing, unless noted otherwise on the Drawings.

2.2 STRUCTURAL PANELS

- A. Structural panels: Conform to PS 2, with a span rating to suit the joist, stud, rafter, or truss spacing, and an Exposure Durability Classification of Exposure 1 unless noted otherwise.
- B. Floor panels: Tongue and groove APA rated Sturd-I-Floor.
- C. Wall panels: APA rated sheathing.
- D. Roof panels: APA rated sheathing.

2.3 ACCESSORIES

- A. Fasteners: Size and type indicated that comply with requirements specified in this article for material and manufacture. Galvanized with a hot-dip zinc coating in accordance with ASTM A153 or made of AISI Type 304 stainless steel for lumber which is exposed to weather, in contact with the ground, or has been chemically treated.
- B. Common Wire Nails: Meet the requirements of FS FF-N-105.
- C. Drywall Screws: Hardened steel, bugle head with length three times thickness of sheathing.
- D. Construction Adhesive: Meet the requirements of ASTM D3498.
- E. Joist Hangers and Framing Anchors: Manufactured by Simpson Strong Tie or approved equal.

- F. Steel Bolts: Steel bolts in conformance with ASTM A307, Grade A with ASTM A 563 hex nuts and flat washers.
- G. For backing panels to electrical or telephone equipment, provide fire-retardant treated structural panel with exterior glue.

2.4 PRESERVATIVE TREATMENT

- A. Where lumber or structural panel is indicated as "treated", or is specified herein to be treated, comply with the applicable requirements of the AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPA Quality Mark requirements.
- B. Pressure-treat above-ground items with water-borne preservatives listed in AWPA P5. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, 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.
- C. Complete fabrication of treated items prior to treatment, wherever possible. If cut after treatment, apply one coat of same chemical used for treatment in accordance with manufacturer's instructions.
- D. Allow preservative to dry prior to erecting members. Inspect each piece of lumber or structural panel after drying and discard damaged or defective pieces.
- E. Provide lumber or structural panels with a retained chemical level as follows:
 - 1. 0.25 pcf for above ground use.
 - 2. 0.40 pcf intended for ground contact and fresh water use.

2.5 FIRE RETARDANT TREATMENT

- A. Testing on the fire performance, strength and corrosive properties of the fire retardant treated wood shall be recognized by issuance of a National Evaluation Services Report.
- B. Fire retardant wood shall meet the flamespread requirement of the assembly rating stated on the drawings when tested in an extended 30-minute tunnel test in accordance with ASTM E-84, NFPA 255 or UL 723.
- C. Fire-retardant lumber must be kiln dried to a maximum moisture content of 19 percent after treatment. All plywood must be kiln dried to a maximum moisture content of 15 percent after treatment.
- D. All fire retardant wood must comply with the requirements in AWPA standard C20 for lumber and C27 for plywood.
- E. The fire retardant chemicals used to treat the lumber must comply with FR-1 of AWPA Standard P17 and must be free of halogens, sulfates and ammonium phosphate.

PART 3 EXECUTION

3.1 GENERAL

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Discard unit of material with defects that might impair quality of work, and units that are too small to fabricate work with minimum joints or optimum joint arrangement.
- D. Installer must examine the substrate structure and the conditions under which the carpentry Work is to be installed, and notify the Contractor in writing of conditions detrimental to the Work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- E. Coordinate carpentry Work with other Work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other Work.

3.2 JOIST FRAMING

- A. Provide framing of sizes and spacings shown.
- B. Install with crown edge up and support ends of each member with not less than 1-7/8 inches of bearing on support.
- C. Attach to wood bearing members by toe nailing or galvanized metal connectors. Provide blocking of joist at ends of joists unless nailed to header or supported by metal joist hanger.
- D. Do not notch joists.
- E. Do not bore holes in PSL which violate manufacturer's recommendations.
- F. Provide bridging between joists.
- G. Framing shall be kept at least 2 inches clear from chimneys and 4 inches away from fireplace walls.

3.3 STRUCTURAL PANELS

- A. Place floor panels perpendicular to framing members with ends staggered and sheet ends over firm bearing. Attach to framing with construction adhesive and nails.
- B. Place wall sheathing with long dimension parallel to wall studs, with ends over firm bearing. Provide solid blocking at ends of sheets. Secure to wood framing with nails of size and spacing shown on Drawings.
- C. Place roof sheathing perpendicular to framing members with ends staggered and sheet ends over firm bearing. Secure to wood framing with nails of size and spacing shown on Drawings.

- D. Oriented strand board with laminated face shall be attached to wood with laminated face against wood framing.

3.4 WOOD GROUND, NAILERS, BLOCKING AND SLEEPERS

- A. Provide wherever shown and where required for screening or attachment of other Work. Form to shapes as shown and cut as required for true line and level of Work to be attached. Coordinate location with other Work involved.
- B. Attach to substrate as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry Work. Where possible, anchor to formwork before concrete placement.
- C. Provide permanent grounds of dressed, preservative treated, key-bevelled lumber not less than 1-1/2" (38mm) wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.5 WOOD FURRING

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finished Work.

3.6 MISCELLANEOUS FRAMING

- A. Firestops:
 - 1. Stud walls: Two inches thick by depth of member blocking at each floor level, top story ceiling level, and soffits as required.
 - 2. Floor and ceiling framing: Two inches thick by depth of wood member blocking, fitted to fill openings from one space to another to prevent drafts.
- B. Framing for mechanical Work:
 - 1. Frame members for passage of pipes and ducts to avoid cutting structural members.
 - 2. Reinforce framing members where damaged by cutting.
- C. Blocking: Locate blocking to facilitate installation of finish materials, casework, fixtures, specialty items and trim railings.

END OF SECTION 061000

DIVISION 07
THERMAL AND MOISTURE PROTECTION

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Polyisocyanurate foam-plastic board.
 2. Glass-fiber blanket.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD

- A. Polyisocyanurate Board, Foil Faced : ASTM C1289, foil faced, Type I, Class 1 or 2.
1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced : ASTM C665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.

2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
 2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

- C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
 - 1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
 - 2. Press units firmly against inside substrates.
 - 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

6. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward exterior of construction .
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.
 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
 2. Install insulation to fit snugly without bowing.

END OF SECTION 072100

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SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vapor-permeable, fluid-applied air barriers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly , 150 sq. ft. , incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
 - b. Include junction with roofing membrane , building corner condition, and foundation wall intersection.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. , when tested according to ASTM E 2357.

2.2 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

- A. High-Build, Vapor-Permeable Air Barrier: synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 60 mils or thicker over smooth, void-free substrates.
 - 1. Synthetic Polymer Type:
 - 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) GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - 2) Henry Company.
 - 3) Tremco Incorporated.
 - b. Basis of Design: GCP Applied Technologies Inc. Perm-A-Barrier Liquid.
 - 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Minimum 10 perms ; ASTM E 96/E 96M, Desiccant Method, Procedure A.
 - c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.

2.3 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge isolation joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.2 INSTALLATION

- A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
- D. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

- E. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils , applied in one or more equal coats.
- F. Do not cover air barrier until it has been tested and inspected by testing agency.
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Air barriers will be considered defective if they do not pass tests and inspections.
 - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- C. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.4 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes standing-seam metal roof panels.
- B. Related Sections:
 - 1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.
 - 2. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Sustainable Design Submittals:
 - 1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
 - 2. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

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1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer certified by manufacturer with work supervisor having successfully completed a manufacturer training program for proper installation of specified product.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items in manufacturer's original, unopened, undamaged packaging with identification labels intact so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Store wall panel materials on dry, level, firm and clean surface. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.
- E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

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1.9 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: 20 years from date of Substantial Completion or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 32 or initial SRI not less than 39 when calculated in accordance with ASTM E1980, based on testing identical products by a qualified testing agency.
- B. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low -slope roof products.

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- C. Energy Performance: Provide roof panels according to one of the following when tested in accordance with CRRC-1:
1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75 .
 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated in accordance with ASTM E1980.
- D. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- E. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested in accordance with ASTM E1680 at the following test-pressure difference:
1. Test-Pressure Difference: 1.57 lbf/sq. ft. .
- F. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E1646 at the following test-pressure difference:
1. Test-Pressure Difference: 2.86 lbf/sq. ft. .
- G. Hydrostatic-Head Resistance: No water penetration when tested in accordance with ASTM E2140.
- H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
1. Uplift Rating: UL 90.
- I. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
1. Fire/Windstorm Classification: Class 1A- 60 .
 2. Hail Resistance: SH.
- J. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces .

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically

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attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
 2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.
- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels : Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Morin, A Kingspan Group Company; SWL or comparable product by one of the following:
 - a. ATAS International, Inc.
 - b. Berridge Manufacturing Company.
 - c. CENTRIA Architectural Systems.
 - d. Metal Sales Manufacturing Corporation.
 2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation or zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.034 inch.
 - b. Exterior Finish: Three-coat fluoropolymer .
 - 1) Basis-of-Design Product: Valspar; FLUROPON®-KYNAR 500® .
 - c. Color: As selected by Architect from manufacturer's full range .
 - 1) Basis of Design Product: Valspar; FLUROPON®-KYNAR 500® .
 3. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.040 inch.
 - b. Surface: Smooth finish.
 - c. Exterior Finish: Three-coat fluoropolymer .
 - 1) Basis of Design Product: Valspar; FLUROPON®-KYNAR 500® .
 - d. Color: As selected by Architect from manufacturer's full range .
 4. Clips: One-piece floating to accommodate thermal movement.
 - a. Material: 0.064-inch nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - b. Material: 0.062-inch thick, stainless steel sheet.
 5. Panel Coverage: 16 inches .
 6. Panel Height: 1.0 inch .
- C. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels : Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Morin, A Kingspan Group Company; SLR or comparable product by one of the following:
 - a. CENTRIA Architectural Systems.
 - b. Merchant & Evans Inc.
 - c. Petersen Aluminum Corporation.
 2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation zinc-coated (galvanized) steel

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sheet complying with ASTM A653/A653M, G90 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Nominal Thickness: 0.034 inch .
- b. Exterior Finish: Three-coat fluoropolymer .
 - 1) Basis of Design Product: Valspar; FLUROPON®-KYNAR 500® .
- c. Color: As selected by Architect from manufacturer's full range .
3. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.050 inch.
 - b. Surface: Smooth finish.
 - c. Exterior Finish: Three-coat fluoropolymer .
 - 1) Basis of Design Product: Valspar; FLUROPON®-KYNAR 500® .
 - d. Color: As selected by Architect from manufacturer's full range .
4. Clips: One-piece fixed to accommodate thermal movement.
 - a. Material: 0.028-inch nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - b. Material: 0.025-inch thick, stainless steel sheet.
5. Joint Type: As standard with manufacturer.
6. Panel Coverage: 16 inches .
7. Panel Height: 2.0 inches .

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, of size and metal thickness in accordance with SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels .

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- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot long sections, complete with formed elbows and offsets, of size and metal thickness in accordance with SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
 - 1. Insulate roof curb with 1-inch thick, rigid insulation.
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- H. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate in accordance with equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

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2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 4. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 5. FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 6. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- D. Aluminum Panels and Accessories:

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1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Mica Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
4. Metallic Fluoropolymer: AAMA 2605. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
5. FEVE Fluoropolymer: AAMA 2605. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

E. Stainless Steel Panels and Accessories:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

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

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

- B. Fasteners:

1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
4. Stainless Steel Panels: Use stainless steel fasteners.

- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners in accordance with manufacturers' written instructions.

- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

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3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Clipless Metal Panel Installation: Fasten metal panels to supports with screw fasteners at each lapped joint at location and spacing recommended by manufacturer.
- G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- I. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- J. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
 2. Connect downspouts to underground drainage system indicated.
- K. Roof Curbs: Install flashing around bases where they meet metal roof panels.

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- L. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 ft. on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074213.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels : Formed with raised, trapezoidal major ribs and a flat pan between major ribs.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI; Cornerstone Building Brands; 7.2 Panel or comparable product by one of the following:
 - a. ATAS International, Inc.
 - b. Englert, Inc.
 - c. Flexospan Steel Buildings, Inc.
 - d. McElroy Metal, Inc.
 - e. MBCI; Cornerstone Building Brands.
 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 0.022 inch or better .
 - b. Exterior Finish: Two-coat fluoropolymer or better.
 - c. Color: As selected by Architect from manufacturer's full range .
 3. Major-Rib Spacing: 4 Inches Min, 8 inches Max o.c.
 4. Panel Coverage: 24 inchesMIN36 inchesMAX.
 5. Panel Height: 0.625 inchMIN, 1.5 inchesMAX.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

- A. Panels and Accessories:
 - 1. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 METAL PANEL INSTALLATION

- A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.13

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SECTION 074213.19 - INSULATED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foamed-insulation-core metal wall panels.
2. Laminated-insulation-core metal wall panels.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site .

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication, installation sequence, and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details for weathertight installation.

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2. Coordination Drawings: Provide elevation drawings and building sections, which indicate panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
3. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
4. Panel Analysis: Provide panel calculations to verify that panels withstand design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between exterior and interior panel facings and resistance to fastener pullout.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 2. Installer: A manufacturer authorized entity that employs experienced installers and supervisors.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

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- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: One year from date of Substantial Completion or starting six months from date of shipment and issued to Owner on date of Substantial Completion, whichever occurs first.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion or starting six months from date of shipment and issued to Owner date of Substantial Completion, whichever occurs first.
- C. Thermal Warranty: Standard form in which manufacturer agrees to repair or replace panels that exhibit greater than 10 percent reduction from published material R-value at time of manufacture as measured in accordance with ASTM C518 within specified warranty period.

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1. Warranty Period: 30 years from date of Substantial Completion or starting three months from date of shipment and issued to Owner date of Substantial Completion, whichever occurs first.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E72:
 1. Wind Loads: As indicated on Drawings.
 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. FM Approval 4881: Wall panel windborne debris rating with large missile impact.
 1. Non-Tropical Cyclone (NTC) Zone H; Class +40/-40 .
 2. Tropical Cyclone (TC) Zone H; Class +45/-45.
 3. Tropical Cyclone Missile (TCM) Zone HM-LM: Class +60/-60.
- C. Freeze/Heat Cycling Test: Panels shall not exhibit delamination, surface blisters, permanent bowing, or deformation when subjected to cyclic temperature extremes of minus 36 to plus 180 deg F for 21, eight-hour cycles.
- D. Air Infiltration: Air leakage of not more than 0.01 cfm/sq. ft. when tested in accordance with ASTM E283 at the following test-pressure difference:
 1. Test-Pressure Difference: 1.57 lbf/sq. ft. .
- E. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
 1. Test-Pressure Difference: 2.86 lbf/sq. ft. .
- F. Water Penetration under Dynamic Pressure: No uncontrolled water penetration through panel assembly when tested in accordance with AAMA 501.1 at the following test-pressure difference:
 1. Test-Pressure Difference: 15 lbf/sq. ft..
- G. Humidity Test: Panels shall exhibit no delamination or metal interface corrosion at 140 deg F and 100 percent relative humidity for 1200 hours (50 days).
- H. Autoclave Test: Panels shall exhibit no delamination or shrinkage/melting of foam core from metal skins at 218 deg F in an autoclave for 150 minutes (2-1/2 hours).
- I. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F , ambient; 180 deg F , material surfaces .

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- J. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics, as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
1. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E119.
 2. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
 3. UL 263 Fire-Rated Wall Assembly Fire Test: 1 -hour fire-rated assembly component of UL Design No. U053 (rated assemblies include appropriate layers of fire-rated Type X gypsum board).
 4. Potential Heat: Acceptable level when tested in accordance with NFPA 259.
 5. Surface-Burning Characteristics: Provide wall panels with a flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E84.
 6. FM Approval 4880: Class I fire rating; panel approved for use without thermal barriers and does not create requirement for automatic sprinkler protection.
 7. FM Approval 4882: Class I low smoke rating.
 8. Ignition Temperature: Foam core minimum 820 deg F flash temperature and minimum 1050 deg F self-ignition temperature as tested in accordance with ASTM D1929.
 9. UL Canada Fire Tests: Pass; fire tests S101, S102, S127, and S134.

2.2 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
1. Insulation Core: ASTM C591, Type IV, modified polyisocyanurate foamed-in-place core using a non-CFC, and non-HCFC blowing agent, compliant with Montreal Protocol and Clean Air Act, with the following minimum physical properties:
 - a. Closed-Cell Content: 90 percent when tested in accordance with ASTM D6226.
 - b. Density: 2.2 to 2.8 lb/cu. ft. when tested in accordance with ASTM D1622.
 - c. Compressive Strength: Minimum 24 psi when tested in accordance with ASTM D1621.
 - d. Shear Strength: 17 psi when tested in accordance with ASTM C273/C273M.
 - e. Tensile Stress: 19 psi in accordance with ASTM D1623.
 - f. Oven Aging at 212 deg F: Tested in accordance with ASTM D2126.
 - 1) Volume Change over One Day: Minus 0.63 percent.
 - 2) Volume Change over Seven Days: Plus 0.43 percent.
 - g. Low Temperature Aging at minus 40 deg F: Tested in accordance with ASTM D2126.
 - 1) Volume Change over One Day: Plus 0.16 percent.
 - 2) Volume Change over Seven Days: Minus 0.60 percent.
- B. Concealed-Fastener, High-Performance Foamed-Insulation-Core Metal Wall Panels : Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.

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1. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan Insulated Panels; KS Azteco or comparable product by one of the following:
 - a. BENCHMARK by Kingspan.
 - b. Green Span Profiles.
 - c. FALK Panel.
 - d. Versawall V by Centria: Embossed & Color by Owner .
2. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.028 inch , 24 gauge .
 - b. Exterior Finish: PVDF Coating, Category 1 Color.
 - 1) Profile: Flat.
 - 2) Embossing: Stucco .
 - 3) Color: As selected by Architect from manufacturer's full range .
3. Panel Coverage: 24 inches nominal.
4. Panel Thickness: 3.0 inches .
5. Thermal-Resistance Value (R-Value): 8.0 deg F x h x sq. ft./Btu per inch 7.2 deg F x h x sq. ft./Btu per inch at 75 deg F mean temperature and at 35 deg F mean temperature in accordance with ASTM C518.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

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1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if

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they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
4. Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat; with a dry film thickness of not less than 0.8 mil for primer, 0.8 mil for color coat, and 0.5 mil for clear coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
5. Stone Epoxy Acrylic: Baked epoxy primer and factory-applied, air-dried, 100-percent acrylic bonder with natural silica aggregate finish; with a dry film thickness of not less than 0.2 mil for primer plus topcoat resulting in minimum 12 mil total dry film thickness.
6. Quartz Epoxy Acrylic: Baked epoxy primer and factory-applied, air-dried, 100-percent acrylic bonder with natural quartz aggregate finish; with a dry film thickness of not less than 0.2 mil for primer plus topcoat resulting in minimum 36 mil total dry film thickness.
7. Siliconized Modified Polyester (SMP): Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
8. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal wall panel manufacturer.
 - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

PRODUCT MASTERSPEC LICENSED BY DELTEK, INC. TO KINGSPAN INSULATED PANELS INC.
3.4 INSULATED METAL WALL PANEL INSTALLATION

- A. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
1. Fasten foamed-insulation-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
 2. Apply panels and associated items true to line for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 3. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
 4. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 5. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
 6. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
 7. Apply snap-on battens to exposed-fastener, insulated-core metal wall panel seams to conceal fasteners.
- B. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
1. Install clips to supports with self-tapping fasteners.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

PRODUCT MASTERSPEC LICENSED BY DELTEK, INC. TO KINGSPAN INSULATED PANELS INC.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.19

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Formed wall sheet metal fabrications.
- 2. Formed equipment support flashing.

B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following

- 1. Underlayment materials.
- 2. Elastomeric sealant.
- 3. Butyl sealant.
- 4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

- 1. Include plans, elevations, sections, and attachment details.
- 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
- 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
- 4. Include details for forming, including profiles, shapes, seams, and dimensions.
- 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
- 6. Include details of termination points and assemblies.

7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches .

C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 INFORMATIONAL SUBMITTALS

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-60 . Identify materials with name of fabricator and design approved by FM Approvals.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.
1. Source Limitations: Obtain sheet from single source from single manufacturer.
- C. Aluminum Sheet: ASTM B209 , alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
1. As-Milled Finish: Mill .
 2. Exposed Coil-Coated Finish:

- a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: As selected by Architect from manufacturer's full range .
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil .
- D. Stainless Steel Sheet: ASTM A240/A240M, Type 304 , dead soft, fully annealed; with smooth, flat surface.
1. Finish: .
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- E. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 temper; coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin).
1. Source Limitations: Obtain sheet from single source from single manufacturer.
- F. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 coating designation, Grade 40 ; prepainted by coil-coating process to comply with ASTM A755/A755M.
1. Surface: Smooth, flat .
 2. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: As selected by Architect from manufacturer's full range .
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil .
- G. Zinc Sheet: 99.995 percent electrolytic high-grade zinc with alloy additives of copper (0.08 to 0.20 percent), titanium (0.07 to 0.12 percent), and aluminum (0.015 percent) ; with manufacturer's standard factory-applied, flexible, protective back coating.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Artazn LLC.
 - b. Rheinzink America.
 2. Source Limitations: Obtain sheet from single source from single manufacturer.
 3. Finish: Bright rolled .
- H. Lead Sheet: ASTM B749 lead sheet.

2.3 UNDERLAYMENT MATERIALS

- A. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F ; and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Molded Products, a division of Atlas Roofing Corporation.
 - b. Intertape Polymer Group.
 - c. Kirsch Building Products.
 - d. SDP Advanced Polymer Products Inc.
 2. Source Limitations: Obtain underlayment from single source from single manufacturer.
- B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ATAS International, Inc.
 - b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - c. GCP Applied Technologies Inc.
 - d. Henry Company.
 - e. Owens Corning.
 - f. Polyglass U.S.A., Inc.
 - g. Protecto Wrap Company.
 - h. SDP Advanced Polymer Products Inc.
 2. Source Limitations: Obtain underlayment from single source from single manufacturer.
 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners , solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 2. Fasteners for Zinc-Tin Alloy-Coated Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.

3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
4. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
5. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.

C. Solder:

1. For Zinc: ASTM B32, 40 percent tin and 60 percent lead with low antimony, as recommended by zinc manufacturer.

D. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

E. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- G. Seams:
 - 1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
 - 3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.6 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:
 - 1. Zinc: 0.032 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.

2.7 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. .
 - 2. Stainless Steel: 0.019 inch thick.
 - 3. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. .
 - 4. Galvanized Steel: 0.028 inch thick.
 - 5. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 - 6. Copper-Clad Stainless Steel: 0.018 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
1. Lap horizontal joints not less than 4 inches .
 2. Lap end joints not less than 12 inches .
- B. Self-Adhering, High-Temperature Sheet Underlayment:
1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 2. Prime substrate if recommended by underlayment manufacturer.
 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 5. Overlap side edges not less than 3-1/2 inches . Roll laps and edges with roller.
 6. Roll laps and edges with roller.
 7. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners , solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder .
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.

5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws .
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F , set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F .
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pretin edges of sheets with solder to width of 1-1/2 inches ; however, reduce pretinning where pretinned surface would show in completed Work.
 2. Do not solder metallic-coated steel sheet.
 3. Do not pretin zinc-tin alloy-coated copper.
 4. Do not use torches for soldering.
 5. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.

- b. Completely remove flux and spatter from exposed surfaces.
 - 6. Stainless Steel Soldering:
 - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - 7. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
 - 8. Copper-Clad Stainless Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.
- H. Rivets: Rivet joints in uncoated aluminum zinc where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
 - 1. Join sections with riveted and soldered joints or joints sealed with sealant.
 - 2. Provide for thermal expansion.
 - 3. Attach gutters at eave or fascia to firmly anchor them in position.
 - 4. Provide end closures and seal watertight with sealant.
 - 5. Slope to downspouts.
 - 6. Fasten gutter spacers to front and back of gutter.
 - 7. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 - 8. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
 - 9. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
 - 10. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts:
 - 1. Join sections with 1-1/2-inch telescoping joints.
 - 2. Provide hangers with fasteners designed to hold downspouts securely to walls.
 - 3. Locate hangers at top and bottom and at approximately 60 inches o.c.
 - 4. Provide elbows at base of downspout to direct water away from building.
 - 5. Connect downspouts to underground drainage system.
- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

3.5 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.

2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings:

1. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches .

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.7 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:

1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.
2. Pipe and install drain line to plumbing waste or drainage system.

3.8 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.10 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.

3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078413

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Mildew-resistant joint sealants.

1.2 PREINSTALLATION MEETINGS

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

1.6 PRECONSTRUCTION TESTING

1.7 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. BASF Corporation.
 - b. Sika Corporation; Joint Sealants.
 - c. Tremco Incorporated.

2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Tremco Incorporated.

2.4 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type O (open-cell material) , and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Corporation.
 - b. Construction Foam Products; a division of Nomaco, Inc.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- 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 in 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 to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Tile control and expansion joints.
 - c. Joints between different materials listed above.
 - d. .
 - e. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, M, P, 50, T, NT .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precaster architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. .
 - e. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, M, 50,T, NT .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doorsandwindows .
 - c. .
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. .
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT .
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .
- E. Joint-Sealant Application: Concealed mastics.
1. Joint Locations:
 - a. Aluminum thresholds.
 - b. Sill plates.
 - c. .
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Butyl-rubber based .
 3. Joint-Sealant Color: As indicated by manufacturer's designations .

END OF SECTION 079200

DIVISION 08
OPENINGS

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior custom hollow-metal doors and frames.
2. Exterior custom hollow-metal doors and frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

1.5 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. BARON Metal Industries, Inc.; ASSA ABLOY of Canada, Ltd.; ASSA ABLOY.
2. Ceco Door; AADG, Inc.; ASSA ABLOY.
3. Concept Frames, AADG, Inc.; ASSA ABLOY Group.
4. Curries, AADG, Inc.; ASSA ABLOY Group.
5. DCI Hollow Metal on Demand.
6. L.I.F. Industries, Inc.
7. Steelcraft; Allegion plc.
8. Titan Metal Products.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
 2. Temperature-Rise Limit: Where indicated on Drawings , provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

2.3 INTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

- A. Hollow-Metal Doors and Frames: NAAMM-HMMA 860; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule .
1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Primed steel sheet, minimum thickness of 0.032 inch .
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Core: Steel stiffened.
 2. Frames:
 - a. Materials: Primed steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Full profile welded.
- B. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule .
1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Primed steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Core: Steel stiffened.
 2. Frames:
 - a. Materials: Primed steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide.
 - b. Construction: Full profile welded.

2.4 EXTERIOR CUSTOM HOLLOW-METAL DOORS AND FRAMES

- A. Commercial Doors and Frames: NAAMM-HMMA 861; ANSI/SDI A250.4, Physical Performance Level A. At locations indicated in the Door and Frame Schedule .
1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum G60 or A60 coating.
 - d. Edge Construction: Continuously welded with no visible seam.
 - e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - f. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - g. Core: Steel stiffened.
2. Frames:
- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, except 0.067 inch for openings exceeding 4 feet wide; with minimum G60 or A60 coating.
 - b. Construction: Full profile welded.

2.5 BORROWED LITES

- A. Fabricate of Primed steel sheet, minimum thickness of 0.053 inch .
- B. Construction: Full profile welded.
- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.8 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 .
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 4. Solidly pack mineral-fiber insulation inside frames.

5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
 7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- B. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 .
 2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
 3. Smoke-Control Doors: Install doors in accordance with NFPA 105.
- C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 .

3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Storefront framing.
 - 2. Manual-swing entrance doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - 2. Include point-to-point wiring diagrams.
- C. Samples: For each type of exposed finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

1.5 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads:
 1. Wind Loads: As indicated on Drawings.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch , whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch , whichever is smaller .
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans of less than 11 feet 8-1/4 inches .
- D. Structural: Test according to ASTM E 330/E 330M as follows:
 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material

- failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. .
 2. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. .
- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. .
- G. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.41 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have SHGC of no greater than 0.35 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.

2.2 STOREFRONT SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Arcadia, Inc.
 2. Avanti Systems USA.
 3. Boyd Aluminum Mfg. Co.
 4. CMI Architectural Products, Inc.
 5. Oldcastle BuildingEnvelope (OBE); CRH Americas, Inc.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: Thermally broken .
 2. Interior Vestibule Framing Construction: Nonthermal .
 3. Glazing System: Retained mechanically with gaskets on four sides.
 4. Finish: Clear anodic finish Color anodic finish .
 5. Fabrication Method: Field-fabricated stick system.
 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 7. Steel Reinforcement: As required by manufacturer.

- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.3 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

2.4 MATERIALS

- A. Sheet and Plate: ASTM B 209 .
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 .
- C. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
- D. Structural Profiles: ASTM B 308/B 308M.
- E. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
 - 4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.5 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior .

6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 1. Color: As selected by Architect from full range of industry colors and color densities.
- C. High-Performance Organic Finish: -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Color and Gloss: As selected by Architect from manufacturer's full range .

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.2 ENTRANCE DOOR HARDWARE SETS

END OF SECTION 084113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mechanical door hardware for the following:
 - a. Swinging doors.

1.2 PREINSTALLATION MEETINGS

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Door hardware schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. 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 an Architectural Hardware Consultant (AHC) .

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Electromagnetic Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Five years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.
 - d. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC A117.1 .

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule on drawings and as follows.

1. 01 Passage
 - a. 1-1/2 Pair Hinges
 - b. Door Silencers
 - c. Levered Lockset with Passage Function
 - d. Door Closer at each leaf
 - e. Kick Plates (2)
2. 02 Storage
 - a. 1-1/2 Pair Hinges OR 3 Pair Hinges (depending on # of leaves)
 - b. Door Silencers
 - c. Levered Lockset with Lockable Storage Function
 - d. Flush Bolt @ 1 leaf if Double Door
 - e. Door Stop @ Floor within 4" of Wall Surface
 - f. Kick Plate on Exterior Side of Door
3. 03 Entry Set
 - a. 3 Pair Hinges
 - b. Door Silencers
 - c. Keyed Levered Lockset with Panic Rim Device
 - d. Keyed Removable Steel Mullion at door center
 - e. Kick Plates at each leaf on both sides of door panels
 - f. Door Closer at each leaf
4. 04 Passage/Panic Set
 - a. 3 Pair Hinges
 - b. Door Silencers
 - c. Passage Levered Lockset with Panic Rim Device including surface mounted locking rod at top and bottom at secondary leaf
 - d. Kick Plates at each leaf on both sides of door panels
 - e. Door Closers with Hold Open Action at each leaf
5. 05 Privacy
 - a. 1-1/2 Pair of Hinges
 - b. Door Silencers

- c. Push/Pull Plates
- d. Deadbolt Latch with Vacancy Indicator
- e. Kick Plates at each leaf on both sides of door panels
- f. Door Closer
- 6. 06 Lockable Storage
 - a. 1-1/2 Pair Hinges
 - b. Door Silencers
 - c. Keyed Lever Lockset with Storage Function

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Stanley Commercial Hardware; a division of Stanley Security Solutions; Div. of The Stanley Works.. or comparable product by one of the following:
 - a. Bommer Industries, Inc.
 - b. McKinney Products Company; an ASSA ABLOY Group company.

2.4 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. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

2.5 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 instructions 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. Basis-of-Design Product: Subject to compliance with requirements, provide Stanley Commercial Hardware; a division of Stanley Security Solutions; or comparable product by one of the following:
 - a. Allegion plc.
 - b. SARGENT Manufacturing Company; ASSA ABLOY.

2.6 CLOSER HOLDER RELEASE DEVICES

- A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by fire alarm system .
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. SARGENT Manufacturing Company; ASSA ABLOY.
 - c. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.7 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Trimco; or comparable product by one of the following:
 - a. Burns Manufacturing Incorporated.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.

2.8 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. Allegion plc.
 - b. Architectural Builders Hardware Mfg., Inc.
 - c. Rixson Specialty Door Controls; an ASSA ABLOY Group company.

2.9 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - c. Trimco.

2.10 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

PART 3 - EXECUTION

3.1 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's "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 work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- 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 of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches .
- E. 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.

3.2 ADJUSTING

- A. 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.

END OF SECTION 087100

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SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
1. Glass for windows storefront framing .
 2. Glazing sealants and accessories.

1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

1.6 PRECONSTRUCTION TESTING

1.7 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.
1. Design Wind Pressures: As indicated on Drawings.
 2. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

2.2 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Ultraclear Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and solar heat gain coefficient of not less than 0.87.

- C. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.
- D. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- E. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- F. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Cardinal Glass Industries, Inc.
- G. Reflective-Coated Vision Glass: ASTM C 1376.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Cardinal Glass Industries, Inc.
 - b. Vitro Architectural Glass.
- H. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.
 - 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. ICD High Performance Coatings.
 - b. Oldcastle BuildingEnvelope (OBE); CRH Americas, Inc.

2.4 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer ionomeric polymer interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:
 - 1. Polyvinyl butyral interlayer.
 - 2. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - 3. Ionomeric polymer interlayer.
 - 4. Cast-in-place and cured-transparent-resin interlayer.
 - 5. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
1. Sealing System: Dual seals.
 2. Perimeter Spacer: Manufacturer's standard spacer material and construction .
 - a. Manufacturers: Subject to compliance with requirements, undefined:
 - 1) Technoform Glass Insulation North America.
 - 2) Thermix; a brand of Ensinger USA.

2.6 GLAZING SEALANTS

- A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Sika Corporation.
 - c. The Dow Chemical Company.
 - d. Tremco Incorporated.
 2. Applications: <Describe types of glazing applications where this sealant is required>.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Spacers:
1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 2. Type recommended by sealant or glass manufacturer.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches .
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.3 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.4 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

3.5 MONOLITHIC GLASS SCHEDULE

- A. Glass Type - Standard Window Repair : Clear annealed float glass.
 - 1. Minimum Thickness: 6 mm .
 - 2. Safety glazing required.

3.6 INSULATING GLASS SCHEDULE

- A. Glass Type - Glazing at New Storefront: Clear insulating glass.
 - 1. Overall Unit Thickness: 1 inch .
 - 2. Minimum Thickness of Each Glass Lite: 3 mm .
 - 3. Outdoor Lite: Annealed float glass.
 - 4. Interspace Content: Argon.
 - 5. Indoor Lite: Annealed float glass.
 - 6. Winter Nighttime U-Factor: 0.40 maximum.
 - 7. Summer Daytime U-Factor: 0.30 maximum.
 - 8. Safety glazing required.

END OF SECTION 088000

DIVISION 09

FINISHES

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Interior gypsum board.
 2. Exterior gypsum board for ceilings and soffits.
 3. Tile backing panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Thickness: 1/2 inch.
 3. Long Edges: Tapered .
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Thickness: 5/8 inch.
 3. Long Edges: Tapered .
- C. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Core: As indicated on Drawings 5/8 inch , Type X.
 3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 3 requirements.
 4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
 5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Core: 5/8 inch , Type X.
 3. Long Edges: Tapered.
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Core: 5/8 inch , Type X.

2.6 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. James Hardie Building Products, Inc.
 - b. National Gypsum Company.
 - c. USG Corporation.
 2. Thickness: 1/4 inch .
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.7 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet .
 2. Shapes:
 - a. Cornerbead.
 - b. LC Bead: J-shaped; exposed long flange receives joint compound.
 - c. J Bead: used to cap drywall ends for finished look
 - d. Expansion (control) joint: install for every 30 feet of drywall in straight connecting lines
 - e. Reveal Bead: used between 2 drywall surfaces; match width and depth to adjacent drywall thickness
 - f. F Reveal Bead: used to create reveal around windows, doors, existing walls, non-drywall surfaces, etc. and drywall surface; match width and depth to adjacent drywall thickness
 - g. Mud On Ceiling Bead: used to install corner grid look for existing ceilings; use anywhere attachment of standard ceiling corner grid is impractical at drywall surfaces

2.8 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound .

D. Joint Compound for Exterior Applications:

1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.9 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hilti, Inc.
 - b. USG Corporation.

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated .
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 3. Level 5: Abuse Resistant Areas .
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- I. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

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SECTION 093013 - CERAMIC TILING

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. Ceramic mosaic tile.
2. Porcelain tile.
3. Stone thresholds.
4. Tile backing panels.
5. Metal edge strips.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- B. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Cementitious backer units.
 - 5. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

A. PT001: Unpolished Porcelain Tile

1. Basis-of-Design Product: Subject to compliance with requirements, provide Crossville, Inc.; Notorious or comparable product by one of the following:
 - a. American Olean; a brand of Dal-Tile Corporation
 - b. Daltile; a brand of Dal-Tile Corporation.
2. Composition: Vitreous or impervious natural clay or porcelain.
3. Module Size: 12x24.
4. Thickness: 10.5 mm.
5. Face: Plain with cushion edges.
6. Surface: Smooth, without abrasive admixture.
7. Dynamic Coefficient of Friction: Not less than 0.42.
8. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
9. Grout Color: As selected by Architect from manufacturer's full range .
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 6x12.
 - b. Drain Mosaic: module size 12x12; factory mounted mosaic; slope to drain

B. Ceramic Tile Type CT001: Glazed Ceramic tile.

1. Basis-of-Design Product: Subject to compliance with requirements, provide American Olean; a brand of Dal-Tile Corporation; Color Story Wall or comparable product by one of the following:
 - a. Daltile; a brand of Dal-Tile Corporation.
 - b. Crossville, Inc.
2. Composition: Vitreous or impervious natural clay or porcelain.
3. Module Size: 4x12 .
4. Thickness: 7.9 mm.
5. Face: Plain with cushion edges.
6. Surface: Smooth, without abrasive admixture.
7. Dynamic Coefficient of Friction: Not less than 0.42.
8. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
9. Grout Color: As selected by Architect from manufacturer's full range .

10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 4.25 x 6 .
 - b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose), module size 4 x 12 Inches .
 - c. Base Cap for Thinset Mortar Installations: Surface bullnose, module size 4 x 12 Inches .
 - d. Wainscot Cap 3x6 .
 - e. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size 3x6 .
 - f. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - g. External Corners: Bead (bullnose), module size 3x6 .
 - h. External Corners for Thinset Mortar Installations: Surface bullnose, module size 3x6 .
 - i. Internal Corners: Cove, module size 3x6 (only in conditions where new tile abuts new tile in a corner).
 - j. Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 10 according to ASTM C1353 or ASTM C241/C241M and with honed finish.
 1. Description: Uniform, fine- to medium-grained white stone with gray veining.
 2. Description: Match Architect's sample.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Georgia-Pacific Gypsum LLC.
 - b. USG Corporation.
 2. Thickness: 1/4 inch or As indicated.

2.6 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.11.
 1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Bostik; Arkema.

- b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Sakrete; CRH Americas, Oldcastle APG.
2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.

2.7 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Bostik; Arkema.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Sakrete; CRH Americas, Oldcastle APG.
2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
3. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.

B. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.

1. Manufacturers: Subject to compliance with requirements, undefined:
 - a. Schluter Systems L.P.

2.9 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.

- c. Tile swimming pool decks.
 - d. Tile floors in laundries.
 - e. Tile floors consisting of tiles 8 by 8 inches or larger.
 - f. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/8 inch.
 2. Quarry Tile: 3/8 inch.
 3. Glazed Wall Tile: 1/8 inch.
 4. Porcelain Tile: 1/4 inch .
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).

- K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 INSTALLATION OF TILE BACKING PANEL

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093013

SECTION 095123 - ACOUSTICAL TILE CEILINGS

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. Acoustical tiles for interior ceilings.
- 2. Fully concealed, direct-hung, suspension systems.

B. Related Requirements:

- 1. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
- 2. Section 095133 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

1.3 PREINSTALLATION MEETINGS

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

- 1. Ceiling suspension-system members.
- 2. Structural members to which suspension systems will be attached.
- 3. Method of attaching hangers to building structure.
- 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
- 5. Size and location of initial access modules for acoustical tile.
- 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.

- g. Perimeter moldings.
- 7. Show operation of hinged and sliding components adjacent to acoustical tiles.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 1 percent of quantity installed.

1.8 QUALITY ASSURANCE

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 - 1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASTM E 580 .
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E 1264.
 - 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL TILES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Armstrong World Industries, Inc.
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide tiles as follows:
 - 1. Type and Form: School Zone #1713 .
 - 2. Pattern: Fine Fissured (medium texture) .
- D. Color: White .
- E. Light Reflectance (LR): Not less than 0.80 .
- F. Ceiling Attenuation Class (CAC): Not less than 35 .
- G. Noise Reduction Coefficient (NRC): Not less than 0.70 .
- H. Edge/Joint Detail: Square Edge .
- I. Thickness: 3/4 inch .
- J. Modular Size: 24 by 24 inches .
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Armstrong World Industries, Inc.

- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C 635/C 635M.
 - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.
- C. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation.
 - 1. Structural Classification: Intermediate -duty system.
 - 2. Access: Upward , with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.
 - a. Initial Access Opening: In each module, 24 by 24 inches .

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
- C. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- D. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.
- E. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Armstrong World Industries, Inc.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
 - 1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2. Finish: Painted to match color of acoustical unit .

2.7 MISCELLANEOUS MATERIALS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger

- involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 7. Do not attach hangers to steel deck tabs.
 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Arrange directionally patterned acoustical tiles as follows:
1. As indicated on reflected ceiling plans.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches o.c.
- 3.4 ERECTION TOLERANCES
- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet , non-cumulative.
 - B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet , non-cumulative.
- 3.5 ADJUSTING
- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
 - B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

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SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoset-rubber base.
 - 2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials , from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 5 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flexco.
 - 2. Johnsonite; a Tarkett company.
 - 3. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - 1. Style and Location:
 - a. Style B, Cove: .
- C. Thickness: 0.125 inch.
- D. Height: 4 inches .
- E. Lengths: Coils in manufacturer's standard length .
- F. Outside Corners: Preformed .
- G. Inside Corners: Preformed .

- H. Colors: As indicated by manufacturer's designations .

2.3 RUBBER MOLDING ACCESSORY

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

- 1. Roppe Corporation, USA.

- B. Description: Rubber stair-tread nosing cap for cove carpet carpet edge for glue-down applications reducer strip for resilient floor covering joiner for tile and carpet transition strips .

- C. Profile and Dimensions: As indicated .

- D. Locations: Provide rubber molding accessories in areas indicated .

- E. Colors and Patterns: Match Architect's sample .

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

- C. Metal Edge Strips: Extruded aluminum with mill finish , nominal 2 inches wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

- 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply five coat(s).
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rubber sheet flooring with backing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient sheet flooring.
 - 1. Include sheet flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples for Initial Selection: For each type of resilient sheet flooring indicated.
- D. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient sheet flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect .
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient sheet flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F , in spaces to receive resilient sheet flooring during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .
- C. Close spaces to traffic during resilient sheet flooring installation.
- D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.
- E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 RUBBER SHEET FLOORING WITH BACKING

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

1. Nora by Interface.
 2. Ramflex by Mondo
- B. Product Standard: ASTM F 1860.
1. Type: Type II, layered rubber sheet floor covering with backing.
 2. Wear-Layer Thickness: 2 MM Minimum .
 3. Overall Thickness: As standard with manufacturer .
 4. Interlayer Material: As standard with manufacturer .
 5. Backing: Foamed rubber.
 6. Hardness: Manufacturer's standard hardness, measured using Shore, Type A durometer per ASTM D 2240.
- C. Wearing Surface: Smooth .
- D. Sheet Width: As standard with manufacturer .
- E. Seamless-Installation Method: .
- F. Colors and Patterns: per Architect's layout and color to be selected from manufacturer's full range .

2.3 INSTALLATION MATERIALS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.

3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Do not install resilient sheet flooring until materials are the same temperature as space where they are to be installed.
1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient sheet flooring.
- B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.
- C. Lay out resilient sheet flooring as follows:
 1. Maintain uniformity of flooring direction.
 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
 3. Match edges of flooring for color shading at seams.
 4. Avoid cross seams.
- D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.
- B. Perform the following operations immediately after completing resilient sheet flooring installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.
 - 1. Apply as Recommended by Manufacturer
- E. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 096516

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SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
- D. Samples for Initial Selection: For each type of floor tile indicated.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive floor tile during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Flooring, Inc.
 - 2. Armstrong World Industries, Inc.
 - 3. Congoleum Flooring.
 - 4. Johnsonite; a Tarkett company.
- B. Tile Standard: ASTM F 1066, Class 2, through pattern .
- C. Wearing Surface: Smooth .

- D. Thickness: 0.125 inch .
- E. Size: As selected by Architect from manufacturers full range.
- F. Colors and Patterns: Match Architect's samples .

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated .
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) .
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
1. Apply five coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Clay masonry.
 - 3. Concrete masonry units (CMUs).
 - 4. Steel and iron.
 - 5. Galvanized metal.
 - 6. Stainless steel.
 - 7. Wood.
 - 8. Gypsum board.
 - 9. Plaster.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
 - 2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 3. Section 055113 "Metal Pan Stairs" for shop priming metal pan stairs.
 - 4. Section 055116 "Metal Floor Plate Stairs" for shop priming metal floor plate stairs.
 - 5. Section 055213 "Pipe and Tube Railings" for shop painting pipe and tube railings.
 - 6. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin Williams Company; Products as designated in Interior Painting Schedule or comparable products by one of the following:

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1. Benjamin Moore & Co.
2. PPG Architectural Coatings.
3. Sherwin-Williams Company (The).

- B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

- B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 50 g/L.
3. Dry-Fog Coatings: 150 g/L.
4. Primers, Sealers, and Undercoaters: 100 g/L.
5. Rust-Preventive Coatings: 100 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Shellacs, Clear: 730 g/L.
9. Shellacs, Pigmented: 550 g/L.

- D. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- E. Colors: As indicated in a color schedule .

1. Ten percent of surface area will be painted with deep tones.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.

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3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Masonry (Clay and CMUs): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

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- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 3.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedule may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

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- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Plastic conduit.
 - f. Tanks that do not have factory-applied final finishes.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. .
 2. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Plastic conduit.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Other items as directed by Architect.
 - h. .
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

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3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Institutional Low-Odor/VOC Latex System :
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.
 - 1) Loxon Concrete & Masonry Primer Sealer. A24W8300
 - 2) Benjamin Moore® Fresh Start® Natura® Zero-VOC Primer 511 (0 g/L), MPI #50, MPI #50 X-Green™, MPI #149, MPI #149 X-Green™; qualifies for CHPS.
 - b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss.
 - 1) ProMar 200 Zero VOC Interior Latex Semi-Gloss. B31-2600 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.
2. High-Performance Architectural System:
 - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - 1) Loxon Concrete & Masonry Primer Sealer. A24W8300
 - 2) Benjamin Moore® Ultra Spec® Masonry Interior/Exterior 100% Acrylic Masonry Sealer 608 (46 g/L), MPI #3; LEED 2009.
 - b. Topcoat: Latex, interior, high performance architectural, semi-gloss (MPI Gloss Level 5), MPI #141 and MPI #141 X-Green™.
 - 1) ProMar 200 Waterbased Acrylic-Alkyd SemiGloss. B35-8200
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

B. Concrete Substrates, Traffic Surfaces:

1. Solvent-Based Concrete Floor Sealer System :
 - a. Primer Coat:
 - 1) ArmorSeal Tread-Plex Waterbased Acrylic Primer. B90 Series
 - b. Intermediate Coat: Sealer, solvent based, for concrete floors, matching topcoat.
 - c. Topcoat: Sealer, solvent based, for concrete floors, MPI #104.
 - 1) ArmorSeal Tread-Plex. B90 Series
 - 2) Benjamin Moore & Co.; Insl-X® Tuffcrete® Solvent Acrylic Waterproofing Concrete Stain CST-5XXX Line (670 g/L), MPI #58, MPI #104.

C. Clay Masonry Substrates:

1. Institutional Low-Odor/VOC Latex System :
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.
 - 1) Loxon Concrete & Masonry Primer Sealer. A24W83000
 - 2) Benjamin Moore® Fresh Start® Natura® Zero-VOC Primer 511 (0 g/L), MPI #50, MPI #50 X-Green™, MPI #149, MPI #149 X-Green™; qualifies for CHPS.
 - 3) Benjamin Moore® Ultra Spec® 500 Interior Primer N534 (0 g/L), MPI #50, MPI #50 X-Green™, MPI #149, MPI #149 X-Green™; LEED v4; qualifies for CHPS.
 - b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss.
 - 1) ProMar 200 Zero VOC Interior Latex Semi-Gloss. B31-2600 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

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D. CMU Substrates:

1. Institutional Low-Odor/VOC Latex System :
 - a. Block Filler: Block filler, latex, interior/exterior.
 - 1) PrepRite Block Filler. B25W25
 - 2) Benjamin Moore® Ultra Spec® Hi-Build Masonry Block Filler 571 (45 g/L), MPI #4; LEED v4; qualifies for CHPS.
 - b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss.
 - 1) ProMar 200 Zero VOC Interior Latex Semi-Gloss. B31-2600 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

E. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System :
 - a. Prime Coat: Primer, rust inhibitive, water based.
 - 1) Pro Industrial Pro-Cryl Universal Primer. B66-310 Series
 - 2) Benjamin Moore® Ultra Spec® HP Acrylic Metal Primer HP04 (48 g/L), MPI #107, MPI #107 X-Green™, MPI #134; LEED v4; qualifies for CHPS.
 - b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147 and MPI #147 X-Green™.
 - 1) Pro Industrial Acrylic Semi-Gloss. B66-650 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.
2. Water-Based Dry-Fall over Shop-Applied Quick-Drying Shop Primer System :
 - a. Prime Coat: Primer, quick dry, for shop application as recommended by topcoat manufacturer.
 - b. Intermediate and Topcoat: Dry fall latex.
 - 1) Pro Industrial Waterborne Acrylic Dryfall Eg-Shel. B42W00082

F. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System :
 - a. Prime Coat: Primer, galvanized, water based.
 - 1) Pro Industrial Pro-Cryl Universal Primer. B66-310 Series
 - 2) Benjamin Moore® Ultra Spec® HP Acrylic Metal Primer HP04-78 (48 g/L), MPI #134; LEED v4; qualifies for CHPS.
 - b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss.
 - 1) Pro Industrial Acrylic Semi-Gloss. B66-650 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

G. Stainless-Steel Substrates:

1. High-Performance Architectural Latex System :
 - a. Prime Coat: Primer, bonding, solvent based.
 - 1) Pro Industrial Pro-Cryl Universal Primer. B66-310 Series
 - 2) Benjamin Moore & Co.; Insl-X® Prime Lock™ Plus Alkyd Primer/Sealer PS-8000 (337 g/L), MPI #69.
 - b. Topcoat: Latex, interior, high performance architectural, semi-gloss.
 - 1) Pro Industrial Water Based Catalyzed Epoxy Semi-Gloss. K46 Series

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- 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

H. Wood Substrates: Exposed framing.

1. Latex over Latex Primer System :

- a. Prime Coat: Primer, latex, for interior wood.
 - 1) PrepRite ProBlock Latex Primer/Sealer. B52 Series
 - 2) Benjamin Moore® Fresh Start® High-Hiding All Purpose Primer 046 (44 g/L), MPI #6, MPI #17, MPI #17 X-Green™, MPI #39, MPI #50, MPI #50 X-Green™, MPI #137, MPI #137 X-Green™; LEED v4; qualifies for CHPS.
- b. Topcoat: Latex, interior, semi-gloss.
 - 1) Pro Industrial Acrylic Semi-Gloss. B66-650 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

I. Wood Substrates: Wood trim and Architectural woodwork .

1. Latex over Latex Primer System :

- a. Prime Coat: Primer, latex, for interior wood.
 - 1) PrepRite ProBlock Latex Primer/Sealer. B51 Series
 - 2) Benjamin Moore® Fresh Start® High-Hiding All Purpose Primer 046 (44 g/L), MPI #6, MPI #17, MPI #17 X-Green™, MPI #39, MPI #50, MPI #50 X-Green™, MPI #137, MPI #137 X-Green™; LEED v4; qualifies for CHPS.
- b. Topcoat: Latex, interior, semi-gloss.
 - 1) Pro Industrial Acrylic Semi-Gloss. B66-650 Series

J. Gypsum Board and Plaster Substrates:

1. Institutional Low-Odor/VOC Latex System :

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC.
 - 1) ProMar 200 Zero VOC Latex Primer. B28W2600
 - 2) Benjamin Moore® Fresh Start® Natura® Zero-VOC Primer 511 (0 g/L), MPI #50, MPI #50 X-Green™, MPI #149, MPI #149 X-Green™; qualifies for CHPS.
- b. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss.
 - 1) Pro Mar 200 Zero VOC Latex Semi-Gloss. B31-2600 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

2. High-Performance Architectural System :

- a. Prime Coat: Primer sealer, interior.
 - 1) ProMar 200 Zero VOC Latex Primer. B28W2600
 - 2) Benjamin Moore® Fresh Start® High-Hiding All Purpose Primer 046 (44 g/L), MPI #6, MPI #17, MPI #17 X-Green™, MPI #39, MPI #50, MPI #50 X-Green™, MPI #137, MPI #137 X-Green™; LEED v4; qualifies for CHPS.
- b. Topcoat: Latex, interior, high performance architectural, semi-gloss.
 - 1) Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss. K46 Series
 - 2) Benjamin Moore® Aura® Waterborne Interior Semi-Gloss Finish 528 (0 g/L), MPI #54, MPI #54 X-Green™, MPI #141, MPI #141 X-Green™, MPI #147, MPI #147 X-Green™; LEED v4; qualifies for CHPS.

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END OF SECTION 099123

DIVISION 10
SPECIALTIES

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SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for supports that attach to overhead structural system.
2. Section 061000 "Rough Carpentry" for blocking .
3. Section 092216 "Non-Structural Metal Framing" for blocking.
4. Section 102800 "Toilet, Bath, and Laundry Accessories" for accessories mounted on toilet compartments.

1.2 COORDINATION

- A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall and ceiling.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Solid-plastic toilet compartments:
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For solid-plastic toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" and ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

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

1. ASI Accurate Partitions.
2. ASI Global Partitions.
3. Contact Industries.
4. General Partitions Mfg. Corp.
5. Metpar Corp.
6. Scranton Products.

- B. Toilet-Enclosure Style: Overhead braced and Floor anchored .

- C. Urinal-Screen Style: Wall hung, Min 11" Deep and Min 42" Tall; mount 16" Above finish floor .

- D. Door, Panel , Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.

1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range .

- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer or stainless steel.

1. Polymer Color and Pattern: Matching pilaster .

- F. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets, clear-anodized aluminum .
2. Full-Height (Continuous) Type: Manufacturer's standard design; polymer or extruded aluminum .
 - a. Polymer Color and Pattern: Matching panel .

- G. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch- thick stainless steel continuous, cam type that swings to a closed or partially open position , allowing emergency access by lifting door. Mount with through bolts.
2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast-stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast-stainless steel bumper at outswinging doors. Mount with through bolts.
5. Door Pull: Manufacturer's heavy-duty, cast-stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.

- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

- A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless Steel Castings: ASTM A743/A743M.
- C. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet compartments and 36-inch- wide, outswinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 102113.19

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SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Public-use washroom accessories.
 - a. Grab Bars
 - b. Mirror Unit
 - c. Shower Curtain Rods
 - d. Robe/Towel Hooks
 - e. Soap Dispensers
 - f. Paper Towel Dispensers
 - g. Toilet Paper Dispensers
 - h. Mop and Broom Holder

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.
 - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. 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.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Betco®
 - 4. Bobrick Washroom Equipment, Inc.
 - 5. Bradley Corporation.
 - 6. General Accessory Manufacturing Co. (GAMCO).
 - 7. Kimberly Clark Professional, Sanitouch
- D. Grab Bar:
 - 1. Basis-of-Design Product: Bobrick #B - 6806
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length: As indicated on Drawings.
- E. Mirror Unit:
 - 1. Basis-of-Design Product: Bobrick #B-165 and Bobrick #B-293 2436 for Tilt Unit.
 - 2. Frame: Stainless-steel channel, Stainless steel, fixed tilt.
 - a. Corners: Mitered and mechanically interlocked, Welded and ground smooth.
 - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - 4. Size: As indicated on Drawings.
- F. Soap Dispenser:
 - 1. Basis for Design: Bobrick B-2013 800 mL Stainless Steel Automatic Hands-Free Foaming Hand / Dish Soap Dispenser
- G. Toilet Paper Dispenser: #967-5 JRT Dispenser, 967-6, 6900730, Smoke Grey.
- H. Electric Hand Dryer:

1. Basis for Design: Saniflow Speedflow Plus M17AB-UL Automatic Steel Black ADA Hand Dryer

2.3 CUSTODIAL ACCESSORIES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 1. A & J Washroom Accessories, Inc.
 2. American Specialties, Inc.
 3. Bobrick Washroom Equipment, Inc.
 4. Bradley Corporation.
 5. General Accessory Manufacturing Co. (GAMCO).
- D. Mop and Broom Holder:
 1. Basis-of-Design Product: B-223 36.
 2. Description: Unit with holders.
 3. Length: 36 inches.
 4. Hooks: Three.
 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

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DIVISION 11
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DIVISION 12
FURNISHINGS

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SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Horizontal louver blinds with polymer slats.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

- 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. CACO, Inc.
 - 2. Comfortex Window Fashions; Comfortex Corporation.
 - 3. Hunter Douglas, Inc.
 - 4. Levolor Inc.
- B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
 - 1. Width: 2 inches .
 - 2. Thickness: 0.016 inch .
- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.

1. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range .
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: Dual cord .
 3. Manual Lift-Operator and Tilt-Operator Lengths: Full length of blind when blind is fully closed .
 4. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard unless otherwise indicated.
- E. Bottom Rail: Secures and protects ends of ladders and lift cords.
1. Type: Manufacturer's standard .
- F. Ladders: Braided cord .
- G. Valance: Manufacturer's standard .
- H. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
- I. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- J. Colors, Textures, Patterns, and Gloss:
1. Slats: As selected by Architect from manufacturer's full range .
 2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated .

2.2 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.
- B. Electrical Connections: Connect motorized operators to building electrical system.
- C. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.
- D. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122113

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DIVISIONS 13 - 19
(NOT USED)

DIVISION 20
FIRE PROTECTION, PLUMBING AND HVAC GENERAL
PROVISIONS

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SECTION 200010 - MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

1.2 MECHANICAL SPECIFICATION SECTION INDEX

Division 20 – Fire Protection, Plumbing and HVAC General Provisions

Section 200010 – Mechanical General Provisions

Section 200020 – Basic Mechanical Requirements

Section 200030 – Mechanical Submittals and Shop Drawings

Section 200035 – Mechanical Systems and Equipment Warranties

Section 200040 – Mechanical Close-out Requirements

Section 200050 – Basic Mechanical Materials and Methods

Section 200060 – Pipes and Pipe Fittings

Section 200100 – Valves

Section 200120 – Piping Specialties

Section 200140 – Supports and Anchors

Section 200170 – Electrical Requirements

Section 200190 – Mechanical Identification

Section 200240 – Mechanical Sound and Vibration Control

Section 200245 – Mechanical Seismic and Wind Restraints

Section 200250 – Mechanical Insulation

Division 22 – Plumbing

Section 220430 – Plumbing Specialties

Section 220440 – Plumbing Fixtures, Trim and Accessories

Section 220450 – Domestic Water Heaters and Accessories

Division 23 – Heating, Ventilating and Air Conditioning (HVAC)

Section 230670 – Packaged Air Conditioners

Section 230756 – Packaged Heat Recovery Equipment

Section 230860 – Fans

Section 230885 – Air Cleaning/Treatment

Section 230890 – Ductwork

Section 230910 – Ductwork Accessories

Section 230980 – Controls and Instrumentation

Section 230990 – Testing, Adjusting and Balancing

1.3 DEFINITIONS

- A. ARCHITECT: Architectural Design firm or ARCHITECT OF RECORD, meaning general building designer whose professional seal appears on the majority of general construction Contract Documents, or their authorized representative.
- B. ENGINEER (ENGINEER-OF-RECORD): ENGINEER whose professional stamp appears on Contract Drawings, etc. In general, unless specifically denoted otherwise, ENGINEER-OF-RECORD in Division 20, 22 and 23 Specification

Sections denotes MECHANICAL ENGINEER-OF-RECORD.

- C. Exposed, or exposed to view: Those installations which can be seen, in whole or part.
- D. Finished Spaces: Inside the building extents.
- E. Inspect and/or Inspection: Utilized for the PROFESSIONAL'S construction period services and defines as "visits by the PROFESSIONAL to the Project at appropriate intervals during construction to become generally familiar with the progress and quality of the CONTRACTOR'S work and to determine if the work is proceeding in accordance with the Contract Documents."
- F. Outside: Synonymous with outdoors, outside of building, exposed to weather, etc.
- G. Plans: Denotes general Construction Drawings prepared by the A/E.
- H. PROFESSIONAL: Authorized representative of ENGINEER-OF-RECORD'S firm.
- I. Provide: Unless specifically denoted otherwise, the CONTRACTOR referred to shall be responsible for furnishing, providing, installing, connecting, and making item or system fully functional in a safe manner as recommended by the manufacturer and by Industry Standards.

1.4 APPLICABLE STANDARDS

- A. The intent is that the complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements from the latest edition of the following:

ANSI	American National Standard Institute
ASHRAE	ASHRAE guides, Latest Editions
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
ICC	International Code Congress
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriters Laboratories

County of Sunflower, Mississippi, Fire, Building, Gas, Plumbing and Mechanical Codes and Regulations, and governing authority having jurisdiction.

- B. Other applicable building, safety or fire codes having jurisdiction over equipment, materials or methods. The decision of the ENGINEER will be final in event of dispute over Code to use or its interpretation.

1.5 GENERAL CONDITIONS

- A. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the ARCHITECT are a part of these Specifications and shall be complied with in every respect.

- B. By the act of submitting a bid, this CONTRACTOR agrees that all of the Contract Documents and each of the divisions of the complete Specifications have been reviewed and studied, and all requirements and coordination resulting there from are included.
- C. This CONTRACTOR shall conform to standards prescribed by City, County, and State regulations or ordinances having jurisdiction. Any changes that may be necessary to conform to such regulations or ordinances shall be made by this CONTRACTOR without extra costs to the OWNER. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed. Where applicable, NFPA requirements shall be met.
- D. The CONTRACTOR shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).
- E. Permits required for the installation of the work, as well as all authorized code inspections, including all fees and assessments, shall be borne by and arranged for by the CONTRACTOR. The CONTRACTOR shall verify specific mechanical related provisions for permitting in advance, especially where additional design/installation documentation may be required, and include provisions and/or cost of same in this bid.
- F. This CONTRACTOR shall provide all items, articles, materials, operations or methods listed, mentioned, or scheduled on the Drawings and/or herein including all labor, materials, equipment and incidentals necessary, required or implied, for the completion of the various systems.

1.6 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, Drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale whenever possible, the CONTRACTOR shall make use of all data in the contract documents and shall verify this information at building site.
- B. Do not scale drawings having 1/4" or smaller scale. The Drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. Because of small scale, it is not intended that Drawings indicate all necessary offsets, and it shall be the work of this Section to install work in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the OWNER.
- C. It is intended that all apparatus be located symmetrically with architectural elements, and shall be installed at exact height and locations as shown on the Architectural Drawings.
- D. The CONTRACTOR shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

1.7 SPECIAL CONDITIONS, MECHANICAL

- A. The right is reserved to move any element as much as ten (10') feet at no increase in cost provided CONTRACTOR is notified before work in question is fabricated or installed.

- B. The CONTRACTOR shall fully inform himself regarding any and all peculiarities and limitations of spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The CONTRACTOR shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the OWNER any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the CONTRACTOR at his own expense. All work which deviates from the Drawings and Specifications without prior approval of the OWNER, shall be altered by the CONTRACTOR at his own expense to comply with the Drawings and Specifications as directed.
- C. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.
- D. The CONTRACTOR shall coordinate his work with that of the OWNER, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the OWNER, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the OWNER at the CONTRACTOR'S expense.

1.8 SITE SAFETY

CONSULTANT'S site responsibilities are limited solely to the activities of CONSULTANT and CONSULTANT'S employees on site. These responsibilities shall not be inferred by any party to mean that CONSULTANT has responsibility for site safety. Safety in, on, or about the site is the sole and exclusive responsibility of the CONTRACTOR alone. The CONTRACTOR'S methods of work performance, superintendence of the CONTRACTOR'S employees and sequencing of construction are also the sole and exclusive responsibilities of the CONTRACTOR alone. The CONTRACTOR shall, to the fullest extent permitted by law, waive any claim against CONSULTANT and his employees and indemnify, defend, and hold CONSULTANT harmless from any claim or liability for injury or loss arising from CONSULTANT'S alleged failure to exercise site safety responsibility. The CONTRACTOR also shall compensate CONSULTANT for any time spent or expenses incurred by CONSULTANT in defense of any such claim. Such compensation shall be based upon CONSULTANT'S prevailing fee schedule and expense reimbursement policy. The term "any claim" used in this provision means "any claim in contract, tort or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or other acts giving rise to liability.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 WORKMANSHIP, MATERIALS AND EQUIPMENT

- A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the Contract Drawings.
- B. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not

delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.

3.2 CLEAN-UP

- A. Do not allow mechanical related waste material or rubbish to accumulate in or about job site.
- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without additional cost to OWNER.
- D. All equipment, fixtures and installations, especially where installations are exposed to view, shall be thoroughly cleaned, polished, seams smoothed and/or sealed for a neat appearance.

3.3 INSPECTION OF PROPOSED CONSTRUCTION

Prior to submitting his bid, the CONTRACTOR shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the CONTRACTOR'S cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project site and thoroughly informed himself of all existing conditions which would affect his work, including requirements of local authorities to meet their procedures, special requirements, codes, etc.

3.4 TEMPORARY ENVIRONMENTAL CONDITIONING

Temporary heating, cooling and dehumidification capability shall be provided for this project beginning a minimum of 90 days prior to the original contract scheduled substantial completion date and maintained until the OWNER'S final acceptance of the project, or any phase thereof. The beginning of this temporary HVAC period is intended to align with general industry standard construction practice of providing a minimum suitable indoor environment for the installation and curing of adhesives, finishes, wall covering(s), tile ceiling/floors, etc. It is highly dependent upon the CONTRACTOR's comprehensive project coordination and scheduling efforts and shall be lengthened (begun earlier) should the CONTRACTOR install such systems and/or finishes which are recommended by the system and/or finish manufacturer to be installed and/or maintained in a minimum environmental condition. This interior space conditioning, known hereafter as "temporary HVAC", includes all areas of the project where the space will be similarly conditioned with heating, cooling and/or dehumidification capability after the project or any portion/phase thereof is completed.

During this minimal temporary HVAC period, the interior space shall be continuously monitored and controlled to provide the following:

- 1. maximum 85 degrees Fahrenheit dry bulb temperature.
- 2. minimum 60 degrees Fahrenheit dry bulb temperature.

3. maximum 60% relative humidity.

In effect, automatic controls for refrigeration, dehumidification, and heating shall be provided such that the indoor building environment, as described above, can be continually maintained. If a system and/or finish manufacturer recommends a more stringent requirement for conditioning, same shall be provided.

The CONTRACTOR shall coordinate such temporary provisions with the all trades and utility companies to accomplish this requirement including adequate temporary power to equipment, etc. All cost and coordination for these temporary HVAC provisions shall be the responsibility of the CONTRACTOR and included in his base bid.

While operating the systems, the intent is to protect the installations from dirt, dust, debris, etc. such that at substantial completion the systems are new, clean and ready for the OWNER's beneficial use. The CONTRACTOR is responsible for protection of the WORK to meet the design intent identified herein. The following minimum requirements shall be met:

1. Completed manufacturer equipment start-up forms must be filled out completely for each and every piece of equipment. Copy of same shall be maintained on file at the project site for verification. Failure to complete the form entirely or maintain copy at project site will result in equipment operation being discontinued without exception.
2. The exterior building envelope is complete including installation of all permanent doors, windows, walls, louvers, roof openings, etc.
3. ALL interior and exterior dust generating activities and subsequent cleanup is complete and approved by the ARCHITECT. Examples of this are exterior sitework around the building, interior sheet rock installation/finishing, floor grinding, spray application of paints/sealers, etc.
4. HVAC Systems shall have pleated air filters of types indicated in Section Air Cleaning/Treatment installed, monitored and periodically replaced when loaded.
5. All R/A grilles and/or openings into ductwork/plenums are fully covered, and protected with filter material of types indicated in Section Air Cleaning/Treatment. These filters shall be continually monitored and periodically replaced when loaded.
6. There is no reduction in specified equipment warranty, capacity, performance, or life of the equipment.
7. HVAC equipment manufacturer's recommendations don't indicate construction practices and installations are harmful to systems, equipment, etc.
8. HVAC equipment manufacturer start-up tests have been performed and accompanying forms have been transmitted to Professional for review. See HVAC equipment specification sections for more information. A copy of same shall be included in Close-out Documents. See Section *MECHANICAL CLOSE-OUT REQUIREMENTS*.

If new HVAC equipment cannot be utilized for providing indoor environmental control during construction for finishes, etc., the CONTRACTOR shall arrange for other temporary HVAC

capacity as required.

If the CONTRACTOR fails to adhere to these guidelines for operation of the permanent building mechanical systems, corrective action by the CONTRACTOR will be required. Corrective action will be determined by the ENGINEER but may include any combination of the following:

1. Cleaning or Replacing Ductwork should it be found with visible dust/debris. A third-party testing/inspection representative may be required depending upon the extent of contamination.
2. Replacement or Cleaning of Equipment should it be found with visible dust/debris/damage. The respective equipment manufacturer's representative will be required to inspect and make written recommendations as to the corrective actions necessary to return the equipment to like new conditions.

The CONTRACTOR will be solely responsible for and include all cost associated with any required corrective actions.

However, permanent HVAC equipment, as described above, shall be fully operational during the last 30 days of the temporary HVAC period such that system performance and controls can be tested, adjusted and balanced per Section Testing, Adjusting and Balancing.

3.5 PHASED CONSTRUCTION AND PARTIAL OWNER OCCUPANCY

- A. Owner will occupy the premises during entire construction period, with the exception of areas under construction. Contractor shall cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.
- B. Where HVAC is impacted by scope of work, Contractor is responsible for maintaining temperature and humidity levels as indicated above in paragraph *TEMPORARY ENVIRONMENTAL CONDITIONING*.
- C. In general, existing HVAC equipment shall remain active until new equipment is fully operational or temporary HVAC equipment shall be installed such that temperature and humidity levels are maintained at all times.

3.6 EXISTING UTILITIES AND SERVICES

- A. When encountered in work, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of work, relocate them as directed. If existing active services are not indicated, contact PROFESSIONAL for instructions.
- B. When encountered in work area, whether or not indicated, cap or plug or otherwise discontinue existing inactive sewer, water, gas, electric, other utility service structures, of which action should be taken. If removal is required, request instructions from PROFESSIONAL.
- C. While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing utilities and systems. Interruptions shall be scheduled and coordinated with ARCHITECT and OWNER and approved in advance with the OWNER and serving

utilities. If requested, downtime shall be limited to weekends and/or night periods to least disrupt normal use of these utilities. The CONTRACTOR shall be responsible for any interruptions to service and shall promptly repair any damages to existing systems caused by his operations.

- D. The accuracy of the location of existing underground, and otherwise concealed, HVAC, domestic, fire protection, sanitary and storm drainage utilities is not guaranteed. The CONTRACTOR shall, early in the project, prior to demolition of existing work and layout of new work, verify all underground and concealed work in the proximity of connections to existing services and routings.
- E. Immediately upon commencing construction, and prior to construction of any part of the facility involved in any way with utilities, the CONTRACTOR shall investigate thoroughly the size, capacity, arrangement and location of all mechanically related utilities. The CONTRACTOR shall immediately report any discrepancies or apparent problem involving the project that pertains to utilities. This applies to private as well as public utilities. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.

END OF SECTION

SECTION 200020 - BASIC MECHANICAL REQUIREMENTS**PART 1 – GENERAL****1.1 SCOPE**

Furnish all labor, materials, services, and equipment required to complete the installation of complete and acceptable mechanical systems in accordance with these specifications and the contract drawings.

1.2 TESTS

- A. This CONTRACTOR shall conduct such tests as required to determine that systems and equipment, which he installs, conform to Specifications. CONTRACTOR shall supply all labor, materials, instruments, operations, etc., required to facilitate testing.
- B. Gauges, thermostats, and instruments used in testing shall be accurate, recently calibrated and approved by the PROFESSIONAL prior to test. Instruments installed permanently in systems as specified herein may be used in testing when approved by the ENGINEER.

PART 2 – PRODUCTS – NOT APPLICABLE**PART 3 – EXECUTION****3.1 MISCELLANEOUS WORK REQUIRED**

- A. The CONTRACTOR shall provide foundations for equipment, chases, furring, framed openings in wall, partitions, etc., installation of wall louvers and grilles in doors, finish painting and all other similar work of a general construction nature. All roof flashing by CONTRACTOR.
- B. The CONTRACTOR shall bring adequate power to and make final connections to all equipment furnished under this Contract.
- C. All items of labor, materials and equipment not specifically stated herein or on Contract Drawings to be by others are required to make the systems complete and operative, shall be by this CONTRACTOR.

3.2 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Responsibility for care and protection of equipment and materials under this Contract rests with this CONTRACTOR until equipment or materials have been tested and accepted.
- B. All pipe ends, valves, ductwork and parts of equipment left unconnected, permanently or temporary, shall be capped, plugged or properly protected at the end of each working day to prevent entry of foreign matter. During the construction process, cover ductwork exposed to weather and/or when not yet installed, with sheet metal caps screwed in place and sealed.
- C. Store equipment, ductwork including pipe and valves, off the ground and under cover. For storage outdoors, minimum 6-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.
- D. Protect air handling unit coils by use of protective sheet metal panels or plywood.
- E. Damaged equipment shall be repaired or replaced at the option of the

PROFESSIONAL. Finishes and/or scratched paint on equipment, etc., shall be repaired and repainted to match new condition(s).

- F. Do not bring insulated equipment or ductwork to job site until same can be adequately protected from wind, rain and damage, etc. In general, store ductwork in building(s) not yet fully enclosed, off the ground and under minimum 6-mil plastic sheeting, etc. This includes dual wall spiral and interior lined rectangular ductwork, and other similar equipment with liners, controls, etc., not recommended to be exposed to wind and water, etc. Such ductwork and equipment found damaged and/or damp shall be immediately replaced and shall not be utilized for this project.
- G. This CONTRACTOR shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The CONTRACTOR shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

3.3 INSTALLATION COORDINATION

- A. The mechanical plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The CONTRACTOR shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactory operating installation. In general ductwork has the right-of-way.
- B. If the CONTRACTOR proposes to install equipment, including piping and ductwork requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the ARCHITECT review the change before proceeding with the work. The request for such changes shall be accomplished by Shop Drawings of the space in question.
- C. The CONTRACTOR shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering the other trades. Piping interferences shall be handled by giving precedence to pipe lines, which require a stated grade for proper operation. For example, sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- D. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel boards, power panels, motor control centers or dry type transformers:
 - 1. Within 42" in front (and rear if free standing) of equipment; or
 - 2. Within 36" of sides of equipment.

3. Clearances apply vertically from floor to structure/ceiling.

3.4 INSTALLATION DIRECTIONS

Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions. Submit such directions and installation details to PROFESSIONAL for approval prior to time of installation for use in supervising work. If the manufacturer's installation instructions or details conflict with the Contract Document requirements, CONTRACTOR shall promptly make PROFESSIONAL aware in writing and request clarification.

3.5 MECHANICAL VERIFICATION AND INSPECTIONS

- A. The CONTRACTOR shall coordinate, with the A/E with a minimum ten (10) days advance notice, the inspection of mechanical sub-systems for the following:
 1. in-wall piping/ductwork
 2. above ceiling piping/ductwork
- B. These inspections shall be coordinated prior to wall and/or ceiling/attic insulation installation, (concealment) etc., such that these mechanical installations can be easily visually inspected by A/E for general conformance with Contract requirements. These installations shall not be concealed until such time the A/E indicates these mechanical installations are acceptable. If a re-inspection is required, an A/E revisit and a follow-up inspection shall be similarly coordinated with sufficient advance notice as approved by the A/E. Therefore, it is pertinent for the CONTRACTOR to inspect these type installations himself and verify that these installations are complete and in conformance with specified standards to minimize any time delays and/or coordination of construction sequencing, etc.
- C. The CONTRACTOR should note the following requirement for administering the punch list(s) and mechanical closeout documents associated with a substantial completion and/or final, etc.
- D. In general, the punch list(s) will be furnished with blanks for the CONTRACTOR and/or his Sub-Contractor(s) to initial and date, adjacent to each item, for coordination and verification efforts. The completed punch list shall be transmitted to A/E to allow them to thereafter schedule a follow-up visit for re-inspection and verification. It is, therefore, prudent for the CONTRACTOR, to administer the overall process, and verify that all punch list items are complete and in compliance with Contract requirements, prior to requesting a follow-up A/E inspection effort.
- E. The CONTRACTOR shall be liable for inspections and further administrative involvement required of the A/E after 30 days of the original scheduled completion date, and for re-inspections and involvement by the A/E caused by the CONTRACTOR'S negligence and failure to fully complete punch lists and Closeout Documents when required and/or requested.

END OF SECTION

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SECTION 200030 - MECHANICAL SUBMITTALS AND SHOP DRAWINGS

PART 1 – GENERAL

1.1 SUBMITTALS AND SHOP DRAWINGS

- A. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. See *Division 01* for more information.
- B. Reproduction of design documents in any portion for use in a submittal is not acceptable.
- C. Provide all additional documentation required to obtain permanent permit for this project as may be required by Authorities Having Jurisdiction. All such additional documentation shall be considered a normal part of the shop drawing with the cost of same included.
- D. Selection of Materials and Equipment:
 - 1. Where a definite material or brand name is specified, it is not the intent to discriminate against any product of another manufacturer. Reference to a specific manufacturer's product by name, make or catalog number is intended to establish standards of quality, design, dimensions and appearance.
 - 2. Open competition is expected, but in all cases, complete data must be submitted for comparison and test when requested by the PROFESSIONAL. Burden of "proof of equality" lies solely with the CONTRACTOR.
 - 3. The products of various manufacturers have been used as the basis of design in preparation of these documents. It shall be the responsibility of the CONTRACTOR to ensure the submitted materials and equipment will fit into the space allotted. Furthermore, verify and maintain adequate access to equipment, valves, filters, lubrication outlets, etc. Any changes to the building or system design necessary shall be arranged for in writing before the materials and equipment is ordered. All costs involved in making such changes shall be borne by the CONTRACTOR.
 - 4. When submitting materials and equipment other than the basis of design, note the following minimum considerations:
 - a. Capacities shown are absolute minimum and must be equaled
 - b. Physical size, weight, etc. limitations
 - c. Noise and vibration levels
 - d. Interchangeability
 - e. Accessibility for maintenance and replacement
 - f. Compatibility with other materials, assemblies
 - g. Similar items shall be furnished by the same manufacturer and style whenever possible.

5. The availability of service is of prime importance to the OWNER and was a major consideration in selecting the materials and equipment that are listed as the basis for design. Competent service must not only be available, but must, in the case of specialty HVAC equipment and control systems, be a direct arm of the manufacturer. Further, the service agency, as a representative of this manufacturer, must have been in continuous operation in this area sufficient time to indicate a degree of permanence.

1.2 SAMPLES AND MOCK-UPS OF PROPOSED INSTALLATION

A. Samples:

1. Provide samples of equipment, components, control devices, etc. as requested by the PROFESSIONAL.
2. These samples are intended to demonstrate quality of construction of proposed installation materials and/or equipment.
3. In general, each substitution request made by the CONTRACTOR will likely require a sample be furnished for review. However, in some cases, samples will be requested of specified equipment, components, control devices, etc. to demonstrate to the Owner the proposed installations.

B. Mock-ups:

1. Provide mock-ups of the proposed installations as requested by the PROFESSIONAL.
2. These mock-ups shall be either in-place or separately constructed at the direction of the PROFESSIONAL.
3. In general, mock-ups shall be of completed proposed installations as coordinated between CONTRACTOR and PROFESSIONAL. In some cases, this will require different levels of completion or staged mock-up construction (i.e. ductwork with taps installed and sealant applied in one section without insulation and insulation applied in another). Some examples of these mock-ups are as follows:
 - a. Rooftop and pad mounted equipment curb
 - b. Ductless Split Systems
 - c. Split Systems
 - d. Rooftop piping support
 - e. Ductwork including rectangular interior lined and exterior wrapped with round taps and run-outs
 - f. Plumbing fixture(s)
 - g. Trapeze piping installation including valves, fittings, insulation and saddles

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 SUBMITTALS AND SHOP DRAWINGS

- A. The following product data submittals for materials and equipment shall be submitted to PROFESSIONAL for approval:
1. SECTION *PIPE AND PIPE FITTINGS*
 - a. Sanitary Waste and Vent Piping Fittings and Connections
 - b. Condensate Drain Piping Fittings and Connections
 - c. Domestic Water Piping Fittings and Connections
 - d. Natural Gas Piping Fittings and Connections
 - e. Refrigerant Piping Fittings and Connections
 - f. Equipment Utility and Relief Drain Piping Fittings and Connections
 2. SECTION *VALVES*
 - a. Manual "Circuit-Setter" Balancing Valves
 - b. Ball Valves
 - c. Gas Valves
 - d. Check Valves
 3. SECTION *MECHANICAL IDENTIFICATION*
 - a. Piping Markers
 - b. Underground Tracer Identification Tape
 4. SECTION *MECHANICAL SOUND AND VIBRATION CONTROL*
 - a. Pipe, Duct and Equipment Vibration Isolation
 5. SECTION *MECHANICAL INSULATION*
 - a. Insulation for all piping applications
 - b. Insulation for all ductwork applications
 6. SECTION *PLUMBING SPECIALTIES*
 - a. Cleanouts
 - b. Floor Drains
 7. SECTION *PLUMBING FIXTURES, TRIM & ACCESSORIES*
 - a. Plumbing Fixtures and Trim
 - b. Carriers
 - c. Handicapped Drain/Water Supply Insulation Protectors
 - d. Hose Bibbs
 - e. Water Hammer Arrestors
 8. SECTION *DOMESTIC WATER HEATERS AND ACCESSORIES*

- a. Water Heaters and Installation Accessories
 - b. Potable Water Expansion Tanks
9. SECTION *PACKAGED AIR CONDITIONERS*
- a. Thru-Wall Units
 - b. Roof Top Units
 - c. Split Systems (Equipment)
 - d. Ductless Mini-Splits
10. SECTION *PACKAGED HEAT RECOVERY UNIT*
- a. Energy Recovery units, equipment,
 - b. Components, Controls, etc., with Performance and Warranty Information.
11. SECTION *FANS*
- a. All Fans, Construction, Accessories, and Finishes
12. SECTION *DUCTWORK*
- a. Round to Rectangular Duct Adapters (Bell mouth)
 - b. Joint Sealant
 - c. Flexible Duct
 - d. Exposed Spiral Duct, Fittings and Shop Drawing Layout
 - e. Dual Wall Spiral Duct Insulation Liner Data
 - f. Fabric Duct Layout Drawings
13. SECTION *DUCTWORK ACCESSORIES*
- a. Duct Access Doors
 - b. Volume Dampers
 - c. Backdraft Dampers
 - d. Spun Aluminum Roof Mounted Intake/Relief Hoods
14. SECTION *CONTROLS AND INSTRUMENTATION*
- a. Control Devices
 - b. Override Timer
 - c. Relays
 - d. Time Clock
 - e. Local Temperature Relay Panel & Labeling
 - f. Wiring Diagrams and Shop Drawings

- g. Sequence of Operation
 - h. Thermostat and Humidistat and Covers
15. SECTION *TESTING, ADJUSTING AND BALANCING*
- a. Testing, Adjusting and Balancing Agency, Certification Credentials, Sample Forms, Instrument List with Calibration History.
 - b. TAB Report – Preliminary with certification of mechanical systems safety and operating controls. Note: Submittal must be transmitted to the Professional 5 days prior to request for substantial completion inspection.

END OF SECTION

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SECTION 200035 - MECHANICAL SYSTEMS AND EQUIPMENT WARRANTIES

PART 1 – GENERAL

1.1 SCOPE

Furnish all labor, materials, services, and equipment warranties as outlined herein for mechanical systems and equipment.

1.2 GUARANTEE AND WARRANTY

A. See Division 01 for warranty start date.

B. INDUSTRY STANDARD GUARANTEE:

See Architectural Specifications.

C. Test Period:

Each piece of equipment shall meet performance specifications after three months' actual operation to OWNER'S satisfaction.

D. CONTRACTOR shall replace, or make good, any defect due to faulty workmanship or material, which shall develop within one year from the beginning of the warranty period. This guaranty shall cover both material and labor. Leaking pipe work is considered faulty workmanship. This warranty shall include repair, removal of defective parts and installation of replacements. The CONTRACTOR shall also be responsible for property damage that results from defects in materials, improper controls or setup, and/or installation during the warranty period.

E. For first year after the warranty begins, CONTRACTOR shall provide, at no cost to the OWNER, any required maintenance and service necessary to assure the proper operation of the installations and systems. Latent defects arising during this period shall, upon notification by the OWNER, be promptly corrected at no additional cost to the OWNER. This shall include:

1. Refrigerant and Oil Replacement in Refrigeration Systems: Leaking refrigerant systems shall be repaired, proved tight, and charged with manufacturer's recommended refrigerant and lubricant, within any standard warranty period.
2. Any adjustments and service required, excluding filter monitoring and replacement.
3. Any necessary adjustments in system control set points when required, excluding filter monitoring.

F. The CONTRACTOR shall make inspections at end of 6th and 11th months after beginning of warranty related to the HVAC control system. During these inspections, the CONTRACTOR shall verify all control settings and recalibrate controls and sensors to match requirements as can be coordinated with PROFESSIONAL based on historical trend by data and to optimize system performance. Temperature and safety controls shall be adjusted as necessary to insure continuous, trouble free, safe, and automatic operation of systems including gas burner, refrigerating equipment, etc.

G. Extended Equipment Warranties

1. Definitions and General Requirements

- a. Extended warranties, defined as a warranty after the standard one (1) year warranty.
- b. "Comprehensive" is defined as a complete warranty except for acts of God and negligent maintenance or operation of the specified equipment as required of the OWNER.
- c. All comprehensive equipment warranties shall include all parts, labor, shipping, postage, freight, handling fees, etc., to accomplish any repair and/or replacement at no additional cost to OWNER. These warranty provisions will be binding on any CONTRACTOR and/or supplier/manufacturer unless specifically approved otherwise in writing by OWNER.
- d. Lack of specific action on any manufacturer's, supplier, and/or CONTRACTOR submitted alternate warranty shall not be construed as approval of same and shall not void the manufacturer and/or CONTRACTOR'S contractual obligation to provide specified warranty.
- e. Third party insurance and/or split CONTRACTOR labor/manufacture's equipment/material warranties shall not be acceptable. Only manufacturer's comprehensive warranties shall be acceptable.

2. Extended Warranties Required

- a. Section *Packaged Air Conditioners* – 4 years compressor parts only non-prorated.
- b. Section *Packaged Heat Recovery Equipment* – 4 years compressor parts only non-prorated.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 GUARANTEE AND WARRANTY

All certificates shall first be presented to the ARCHITECT for approval. After approval, copies of the certification(s) shall be forwarded to the OWNER by the CONTRACTOR.

END OF SECTION

SECTION 200040 - MECHANICAL CLOSE-OUT REQUIREMENTS

PART 1 – GENERAL – NOT APPLICABLE

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 AS BUILT DRAWINGS

Project Record Documents and As Built Drawings:

- A. Maintain at job site a set of contract record documents kept current by indicating thereon all changes, substitutions, etc., between work as specified and as installed.
- B. Show on record documents actual air quantities, water flow rates, valve or damper positions after balancing, etc.; also show, by actual dimension, location of all new and known existing underground work.
- C. At the completion of the project, furnish the OWNER three (3) set(s) of bluelines and three (3) complete, clean sets of specifications showing installed location, size, etc., of all work and material as taken from record documents. All as-built (on record) drawings shall be labeled "As-Built Drawings," dated and certified accurate by CONTRACTOR with his signature, on front page of all Drawing Blueline sets and Specifications.

3.2 OPERATION AND MAINTENANCE MANUALS

- A. Submit three (3) complete sets of bound brochures in 8-1/2" x 11" spring post binders, indexed and tabled by equipment type (Air Handler, Plumbing Fixtures, etc.).
- B. Include in these brochures written submittal data, manufacturers operating and maintenance procedures and recommendations, spare parts lists and suppliers and any interlocking control or wiring diagrams for all equipment. The information listed herein is to be bound in the following order:
 1. First sheet to list ARCHITECT, ENGINEER, CONTRACTOR and Sub-Contractors with addresses for each.
 2. Second sheet to list type of equipment with sequential number, the manufacturer, make, model and serial number of the actual equipment nameplate data rated horsepower, full load rated amps, voltage and phase.
 3. Next, actual copy of approved submittal data including all manufacturers published information on capacities, capacity curves or tables, accessory and control item lists, and other pertinent information as requested by ENGINEER. Cross-reference all equipment to Contract Documents.
 4. Next, copy of all spare parts list and suppliers' contact information.
 5. Next, include the manufacturer's published operating and maintenance procedures.
 - a. Include instructions to stop and start each piece of equipment including reference to controls and interlocks and an itemized maintenance schedule detailing procedure and interval of periodic maintenance items. Start this log of the maintenance list(s) by

accomplishing the initial required maintenance procedure(s) for each and every maintenance item.

- b. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Bulletins shall be clearly marked for the equipment furnished. Where a bulletin contains more information than that for the installed equipment, such extended information shall be deleted by crossing it out or by stripping it from the bulletin.
6. All system operating instructions that were earlier approved by PROFESSIONAL and utilized for OWNER personnel education shall also be inserted herein.
- C. This bound information will require the PROFESSIONAL'S signed approval before this contract is complete. No exceptions will be granted.
 - D. A copy of HVAC and Plumbing equipment, and sprinkler system operation and maintenance (O & M) Manufacturer's recommended brochures shall be transmitted to the TAB Agent within ninety (90) days after Notice to Proceed such that TAB Agent shall utilize same in preparation of Owner's Personnel Education/Agenda.
 - E. The manuals shall be previously approved by the PROFESSIONAL and transmitted to the OWNER at least one week prior to the final inspection.

3.3 OWNER EDUCATION

- A. OWNER Representative Education and Operating and Maintenance instructions
 - 1. During the last phase of the project, the CONTRACTOR, in conjunction with the applicable SUB-CONTRACTORS shall coordinate and facilitate the start-up, Testing, Adjusting and Balancing, and subsequent OWNER'S representatives' education and instruction.
 - 2. The OWNER education shall be administered by the CONTRACTOR, with special instructions from equipment technical representatives, CONTRACTOR qualified representatives, etc.
 - a. The instructions for the OWNER will include a complete walk-through of the facility, review of all mechanically related systems, and comprehensive education of the pertinent operating and maintenance requirements.
 - b. This shall include an overview of system components and descriptions, seasonal provisions/changes required, major valve location/function, safety provisions and concerns, normal operating and energy conservation techniques, actions to be taken with system failure or malfunction, start-up and shut-down instructions, reaction

- to fire and safety alarm annunciation, normal operating parameters, etc.
- c. The education shall include all pertinent data from industry standards, minimal recommendations indicated herein and further as recommended by each manufacturer's O&M manuals.
 - d. All equipment and material suppliers will also be expected to participate. The CONTRACTOR shall schedule with the A/E and designated OWNER'S Representative(s).
 - e. Additional instruction and education sessions shall be provided subsequent to the initial session to provide additional instruction as required to fully educate the OWNER'S operators.
3. The CONTRACTOR shall submit to the PROFESSIONAL in draft form, an outline of the contents of this education, with agenda and list of pertinent personnel, a minimum of thirty (30) days prior to project completion date and scheduling said instruction with the OWNER and PROFESSIONAL.
 4. When the seminar and subsequent instruction periods are completed, CONTRACTOR shall furnish ARCHITECT a letter signed by the OWNER certifying that his representative(s) has received adequate instruction in operation of installed equipment and systems. This letter shall be furnished prior to final acceptance of this project.
- B. Some suggestions for pertinent subject matter to include in the administration of the education of OWNER'S operation and maintenance personnel, is as follows:
1. Nominal Split and Packaged Direct Expansion Cooling and Heating Systems:
 - a. Air filter size, monitoring and changeout (note that CONTRACTOR is to provide a schedule to OWNER, indicating all systems, filter grilles, etc., and matched sizes) and number of air filters.
 - b. Periodic bearing lubrication
 - c. Periodic belt monitoring and adjustment
 - d. Periodic evaporator and condenser coil inspection and cleaning
 - e. Periodic monitoring of refrigerant charge by (1) visual observation of site glass, and (2) discharge air temperature monitoring
 - f. Normal temperature and fan controls setpoints for occupied and unoccupied periods.
 - g. Normal indoor humidity setpoints for all periods
 - h. Condensate drain periodic inspection and maintenance; including algaecide
 - i. Smoke detection and fire alarm interaction
 2. Potable Water Heaters and Accessories:
 - a. Normal setpoint and adjustment for water temperature from heater

- b. Function and periodic maintenance of T&P relief valve.
- c. Function and periodic maintenance of anode rods.
- 3. Heat Recovery Direct Expansion Cooling & Heating Systems:
 - a. Purpose for use during occupied periods (and unoccupied periods, where applicable)
 - b. Same items under nominal split and packaged direct expansion cooling and heating systems
 - c. Periodic monitoring and maintenance for heat recovery wheel and motor
 - d. OWNER'S instructions for setpoint control, monitoring and utilizing control panels & alarms, trend log and remote data acquisition capability
 - e. Warranties
- 4. Exhaust Fans:
 - a. Periodic bearing lubrication
 - b. Periodic belt monitoring and adjustment
 - c. Periodic fan blade & grille inspection for excessive dust build-up, etc.
- 5. Controls:
 - a. Describe setup and operation (including override functions) of programmable thermostats.
 - b. Calibration of sensors (temperature, humidity, etc.)
 - c. Describe purpose of duct smoke detection, HVAC unit shut-down, and remote smoke detector alarm panels and reset procedures.
- 6. General:
 - a. Warranties: Explain the various warranties. Explain to OWNER his role during the warranty period(s), his limitations who he is to call when a problem tied to a warranty issue occurs, for both the one-year standard warranty and extended warranties, etc.
 - b. Special tools and spare parts
 - c. Air filter spares
 - d. Purpose of O & M Manuals (spare parts, O & M manufacturer's recommendations, trouble-shooting, etc.)
 - e. Purpose of roof mounted hydrant.

3.4 CLOSEOUT DOCUMENTATION

- A. Seven (7) days prior to requesting a final inspection, the CONTRACTOR shall submit all O&M and closeout documentation to the ARCHITECT, to be turned over to the OWNER at the end of the project.
- B. The following checklist shall be utilized for compiling documentation and shall be

included behind front cover of O&M manuals.

- C. CONTRACTOR shall initial and date each line item once completed and shall fax or email copy of the completed checklist to the PROFESSIONAL prior to final inspection request.

CLOSEOUT DOCUMENTATION CHECKLIST PLUMBING		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Signed Letter Record of Owners Personnel O & M Education
		Plumbing Operation & Maintenance Manuals (3 each)
		As-Built Drawings with Contractor's Stamp (3 each)
		Potable Water Sanitation Report and Certification
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to plumbing stops and hose bibb boxes per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Plumbing Fixtures, Trim and Accessories</i> (provide written receipts with Owner's acceptance).

CLOSEOUT DOCUMENTATION CHECKLIST MECHANICAL		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Final TAB Report (3 each required)
		Signed Letter Record of Owners Personnel O & M Education
		Mechanical HVAC Operation & Maintenance Manuals (3 ea)
		As-Built Drawings with Contractor's Stamp (3 each)
		Completed HVAC equipment factory start-up forms for each individual unit.
		Extended Warranties: (See Section <i>Mechanical Systems and Equipment Warranties</i>)
		Provide list of all spare air filter sets per Section <i>Air Cleaning/Treatment</i> . List number, size, type and location/equipment match-up.
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Duct Test Log - Form in Section <i>Ductwork</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to control panels and sensor/controller covers per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Controls and Instrumentation</i> (provide written receipts with Owner's acceptance).

END OF SECTION

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SECTION 200050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. The requirements of this section apply to all sections of Division 20, 22 and 23.
- C. Definitions:
 - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms, including mechanical and/or equipment rooms.
 - 2. Option or Optional: CONTRACTOR'S choice of an alternate material or method.

1.2 PRODUCTS CRITERIA

- A. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- B. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or otherwise permanently marked on each item of equipment.

1.3 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flame spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50. (Note: Materials need not meet these requirements where they are entirely located outside of a building and do not penetrate a wall or roof, and do not create an exposure hazard.)
- B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building materials," NFPA No. 255, ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc., "Building Materials List" under the heading "Hazard Classification (Fire)".

1.4 HAZARDOUS MATERIALS

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this specification Division.

1.5 EQUIPMENT FURNISHED BY OWNER

- A. The CONTRACTOR shall unload, uncrate, assemble, and connect any and all

equipment shown on the Drawings or called out in the Specifications to be furnished by the OWNER for installation by the CONTRACTOR.

- B. The CONTRACTOR shall protect and take full charge of such equipment from the time the items are delivered to the job, set in place, connected, tested, adjusted, and placed into operation.

PART 2 – PRODUCTS

2.1 EQUIPMENT ACCESSORIES

- A. Provide removable guards to enclose all rotating or moving elements. Construct of galvanized steel to withstand 250 lbs. static load.
- B. Wall/Ceiling Access Doors
 - 1. Panels in non-rated applications shall be galvanized steel, 18-gauge frame, 16-gauge door with mounting accessories, piano hinges, screwdriver operated lock, and prime coat paint.
 - a. Acudor Model UF-5000 for acoustic tile or exposed masonry
 - b. Acudor Model PS-5030 for plaster finishes
 - c. Acudor Model UF-5000 (stainless steel) for ceramic or glazed structural tile.
 - 2. Panels in fire rated applications shall be painted steel type, 1 hour rated, piano hinged, exterior key lock, nominal size 24" x 36" at equipment installations as approved, Air Balance, Inc. - Model "F".

2.2 ROOF CURBS

- A. Curbs shall be constructed as required to hold top level. See detail on Drawings for more information on curb construction requirements.
- B. Auxiliary supports under curbs shall be constructed as approved by ARCHITECT.

2.3 FIRE, SMOKE AND SOUND STOPPING

- A. UL listed penetration sleeve assembly and/or firestop that meets ASTM E-814 E119, and E84, as "3M" systems for the intended applications.
- B. All fire, smoke and sound stopping to be done by a separate licensed and certified Subcontractor as approved by Professional.

2.4 PIPE SLEEVES

- A. Galvanized sheet metal sleeves shall have lock seam joints and comply with the following minimum thickness:
 - 1. 24 Gauge for 3 inches and smaller.
 - 2. 22 Gauge for 4 inches to 6 inches inclusive.
 - 3. 20 Gauge for sizes over 6 inches.
- B. Galvanized steel sleeves shall be constructed from schedule 40 grade A53 pipe.
- C. PVC sleeves shall be constructed from solid core Schedule 40 PVC pipe.
- D. Water tight sleeves/seals shall be equal to "Link-Seal".

2.5 WALL, FLOOR, AND CEILING PLATES

- A. Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve.
- B. The thickness shall conform to the following requirements:
 - 1. Not less than 3/32 inch for floor plates.
 - 2. For wall and ceiling plates, not less than 0.025" for up to 3 inch pipe and 0.035" for larger pipe.
- C. All escutcheons shall be equal to Beacon, Caldwell or approved equal.

2.6 PROTECTIVE DRIP PANS

- A. Fabricate pans of 20-gauge galvanized sheet metal, stainless steel (if shown) or PVC, minimum two inches deep with rolled top edges.
- B. Solder all seams watertight, and cross brace pans to prevent sagging and warping.
- C. Provide dielectric union at copper pipe/galvanized pan connection point. Water heater drain pans shall have minimum one inch (1") drain outlet.

2.7 PAINTING OF MECHANICAL WORK

- A. See Division 09 for more information.

PART 3 – EXECUTION

3.1 EQUIPMENT ACCESSORIES

- A. Provide access panels, or doors, at concealed dampers, valves, vents, equipment, inspection points, etc., and where noted. Where ceiling is "lift out" construction, ceiling access panels are not required. Panels shall be 15" square, or larger as approved for service intended.
- B. CONTRACTOR shall provide substantial metal angle frame and support at all ceiling access doors.

3.2 ROOF CURBS

- A. All roof mounted equipment shall be furnished with a roof curb compatible with both the equipment configuration and roofing system. Curbs shall be installed level by either shimming or sloped curb construction. See detail on Drawings for more information on curb construction requirements.
- B. Provide auxiliary support under all roof mounted equipment under curb base and at all penetrations as approved by ARCHITECT.

3.3 FIRE, SMOKE AND SOUND STOPPING

- A. Fire and smoke stopping shall be provided and installed at all locations where mechanical Work passes thru rated assemblies. This includes all ductwork, piping and controls related conduit.
- B. Penetrations in "sound" walls shall be similarly acoustically sealed, both sides of wall with caulk or other approved material. New and existing walls extending to the roof/floor structure above are considered sound walls.

3.4 PIPE SLEEVES

- A. Pipe sleeves shall be constructed of galvanized sheet steel except where noted below or in individual work sections.
- B. Pipe sleeves shall be constructed of galvanized steel or schedule 40 PVC pipe when pipes are located within or passing through the following:
 - 1. concrete beams
 - 2. outside walls
 - 3. foundations
 - 4. footings
 - 5. waterproofed floors
 - 6. In locations where sleeve is extended above finished floor
- C. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe.
- D. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulations.
- E. Check floor and wall construction and finish to determine proper length of sleeves for various locations, make actual length to suit following:
 - 1. Terminate sleeve flush with walls, partitions, and ceilings.
 - 2. In areas where pipes are concealed as in chases, terminate sleeves flush with floor.
 - 3. In finished areas where pipes are exposed, extend sleeves 1/4" above finished floor except in kitchen, toilets, equipment rooms, and other areas where water may accumulate on floor, extend 1 1/2".
- F. Interior openings shall be caulked tight with fire, smoke or sound stopping material and sealant to prevent the spread of fire, smoke, and sound. Contractor shall coordinate specific requirements to ensure fire, smoke or sound ratings are maintained.
- G. For drilled penetrations in existing floors provide one-inch angle rings set in silicone sealant and bolted to the floor in lieu of pipe sleeves with one inch extension above floor.
- H. Below grade exterior wall penetrations into habitable spaces, including crawlspaces shall include sleeves with water tight seals as "Link-Seal".

3.5 WALL, FLOOR, AND CEILING PLATES

- A. Exposed piping passing through walls, floors and ceilings, shall be fitted with escutcheons.
- B. Inside diameter shall fit around insulation or around pipe when not insulated; outside diameter shall cover sleeve.
- C. Use plates that fit tight around insulation or pipes when not insulated.
- D. Plates shall cover openings around pipes/insulation and cover the entire pipe sleeve

projection.

3.6 PROTECTIVE DRIP PANS

- A. Provide pitched drip pans where shown under all fluid conducting piping that is over electric switchgear, elevator controllers, busways or electric motor starters or as indicated. Pans shall extend minimum two inches beyond each side of the mechanical equipment, pipe or group of pipes being contained. Pans shall extend six inches beyond electrical equipment below.
- B. Pitch pans shall be routed to a drain connection with discharge piped utilizing ¾" or larger of copper tube to the nearest available open drain or outside as directed by PROFESSIONAL. Open-end slices discharging to intercepting pans are not acceptable.
- C. Provide drip/overflow pans under water heaters, air conditioning equipment, pumps, etc., and where shown.

3.7 PAINTING OF MECHANICAL WORK

- A. All equipment shall present a clean painted appearance; touch up or repair as required.
- B. All surfaces shall be properly prepared prior to painting. CONTRACTOR must contact PROFESSIONAL, such that all tests, installations etc., are approved prior to painting.
- C. The CONTRACTOR shall prime (where applicable) and paint the following mechanical related Work:
 - 1. Piping of the following types which are outdoors and indoors when exposed to view, including mechanical rooms:
 - a. New Natural Gas Piping.
 - b. Existing Natural Gas Piping modified in this project. Existing piping shall be cleaned, primed and painted as specified herein.
 - c. Domestic Water Piping.
 - d. Sanitary Drain/Vent Piping.
 - 2. All exposed ferrous metal non-galvanized hangers, auxiliary supports, braces, etc., in all locations.
 - 3. All exposed and exterior galvanized ductwork, plenums, access doors, and control conduit, fitting, boxes, etc.
 - 4. All insulated refrigerant piping, pumps, valve bodies, etc., where exposed to view outdoors.
 - 5. All new or modified fire hydrants, metal valve and metal box covers, post indicator valves, gas meter/regulators, and the like. This includes items provided and installed by others, and existing on-site installations.

3.8 WELDING

Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the

ASME Boiler and Pressure Vessel Code for each and every welder intended for use on this project and with qualifications and certifications suitable for work classification intended.

- A. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld. Submit certification according to Section *Mechanical Submittals and Shop Drawings* for each and every welder and welding associated with the project.
- B. The types and extent of non-destructive examinations required for pipe welds are shown in Table 146.4 of the Code of Pressure Piping ANSI/ASME B31.1.

3.9 TOOLS AND KEYS

- A. Furnish, and turn over to the OWNER, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Provide OWNER, at end of project with spare keys to stops, hose bibbs, control cabinets, tamper-proof controls covers, etc. Provide the following spares, and label with function/locations:
 - 1. Plumbing Stops – 8 keys
 - 2. Hose Bibbs – 8 keys
 - 3. Control Panels – 4 keys each panel
 - 4. Tamper-proof Controls Cover – 2 keys per cover
 - 5. Wall and Ceiling Access Doors – 2 keys per door

3.10 LUBRICATION

- A. During construction, all bearings and shafts shall be kept thoroughly greased and protected.
- B. After equipment has been operated seven days and before final acceptance, all bearings shall be inspected and filled to operating level with lubricant recommended by manufacturer. Tag each piece of equipment with cloth tag showing: proper type of lubricant, and period between lubrications, date of lubrication, and worker's initials. Have space for ten (10) lubrication notations.

3.11 WORK IN AND AT EXISTING BUILDING AND/OR BUILDING SITES

- A. Perform as described or shown on Contract Drawings, for relocation of existing equipment, alterations and restoration of existing building(s).
- B. As specified on Contract Drawings, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
- C. It is important that CONTRACTOR thoroughly investigate existing conditions, utilities, services, finishes, sized, connections, etc., prior to bidding this project. The Designer's responsibility included only a cursory review of existing conditions and/or installations. It is the CONTRACTOR'S responsibility to coordinate a more thorough investigation and ascertain and confirm pertinent installation connections, etc., prior

to his bid. This investigation shall be coordinated in a minimum seven (7) days advance of any published bid date such that the CONTRACTOR immediately thereafter can advise Designer in writing of any design discrepancies and/or changes required; otherwise, the CONTRACTOR shall be required to remedy any such peculiarities at his own expense and at no additional cost to the OWNER. It is the CONTRACTOR'S responsibility to verify existing size and/or location, etc., any time replacement and/or modifications to existing are included as a part of this project.

- D. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground services, structures and conflicts. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures.
- E. The CONTRACTOR shall be responsible for obtaining the services of an "Independent Locator" whose function shall include location and identification of all underground service wiring, piping, coax, fiber optics, etc. The CONTRACTOR shall make every effort to protect and avoid conflicts with existing installations. Damage caused to existing installation by CONTRACTOR, or his Sub-contractor, etc., shall be promptly remedied and put back into service, per serving utility requirements.
- F. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the ENGINEER will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
- G. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the ENGINEER to prevent future damage or contamination of either structure.

3.12 PROTECTION AND CLEANING

- A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the PROFESSIONAL. Damaged or defective items, in the opinion of the PROFESSIONAL, shall be replaced.
- B. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- C. Do not store insulation materials in building until it is enclosed and dry. Wet insulation shall not be installed.
- D. Fixtures, piping, ducts, equipment, etc., shall be cleaned per manufacturer's printed instructions and PROFESSIONAL'S instructions.
- E. Piping shall be: (1) flushed with clean water, (2) "blown out" with steam or compressed air, or (3) "swabbed out" as required, except where specified otherwise.

All temporary connections required for flushing shall be provided and subsequently removed by the CONTRACTOR. See Section *Pipe and Pipe Fittings* for further instructions.

- F. Before final building interior finish is applied:
 - 1. Interior of air handling equipment shall be thoroughly cleaned.
 - 2. Drain pans shall be cleaned and then flushed with water after which all fans will run with air filters in place, etc., for 24 hours.

3.13 CUTTING AND PATCHING

- A. Do not cut into any major structural element without written approval of the ARCHITECT.
- B. Cut required openings through existing masonry or reinforced concrete with diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the ARCHITECT. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the ARCHITECT for determination of proper design for openings through structural sections and opening layouts for approval prior to cutting or drilling into structure. After ARCHITECT'S approval, carefully cut openings through construction no larger than absolutely necessary for the required installation.
- C. Patching shall be (1) of quality equal to, and of appearance matching existing construction, and (2) shall restore all services and construction that remains in use, to its condition prior to this contract, unless otherwise noted.

3.14 FLASHING

- A. Where pipes, ducts, etc., pass through roof or walls, flash and caulk.
- B. Provide flashing or caulking as required at each opening through outside walls or roof. Flashing through roof of same materials and methods as under Moisture Protection Division; through walls shall be aluminum unless noted otherwise.

END OF SECTION

SECTION 200060 - PIPES AND PIPE FITTINGS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified and/or shown or scheduled on Contract Drawings.
- B. Work included: Pipes, fittings, unions, couplings, flanges, gaskets, and other materials and instructions.

1.2 PIPING SCHEDULE

Piping systems for this project shall include the following:

- A. Sanitary Waste and Vent Piping.
- B. Condensate Drain Piping.
- C. Domestic Water Piping.
- D. Natural Gas Piping.
- E. Refrigerant Piping.
- F. Equipment Utility and Relief Drain Piping.

1.3 MANUFACTURER'S ASSISTANCE

Manufacturer shall provide, if required, to the CONTRACTOR a factory trained service man to properly train CONTRACTOR'S personnel in all phases of installation.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

All piping installed on this project shall be new and of full weight and size indicated and of proper specification for service intended. Only domestic pipe may be used. Pipe and pipe fittings for the various systems shall be as follows:

- A. Sanitary Waste and Vent Piping.
 - 1. Piping above and below slab on grade extending to five (5) feet outside building perimeter, shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - 2. Sanitary waste piping below grade outside building shall be as specified in *Civil Division*.
- B. Condensate Drain Piping.
 - 1. Condensate drain piping routed indoors shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings, or Schedule 40 PVC with solvent weld joints and fittings, paying close attention to spacing of piping supports in Section *Supports and Anchors*.

- C. Domestic Water Piping.
1. Piping above slab on grade inside building shall be Type "L" copper with 95/5 soldered joints or specialty piping systems such as "ProPress" by Viega. "T-drill" or "pulled" taps/outlets shall NOT be utilized; only full body fittings will be allowed.
 2. Piping below slab on grade and to a point ten (10) feet from building perimeter shall be Type "K" copper pipe with brazed joints. Note: There shall be no joints below slab on grade except at building entrance service on piping 2" and larger.
 3. Underground service entrance at building shall be single extended 90 degree fitting of fabricated 304 stainless steel, maximum working pressure of 200psi.
 - a. Sizes 2"-3" equal to Watts Series TR2. Provide with grooved or MNPT connections on inside of building. Provide with grooved, MNPT or flanged connections outside of building.
 4. Piping routed outside building below grade, shall be as specified in Section *Civil Division*.
- D. Natural Gas Piping
1. Piping above slab on grade and extending from meter or regulator shall be Schedule 40 black steel pipe complying with ANSI B36.10, ASTM A53 or ASTM A106 with class 150# Malleable iron or steel fittings. Joints in piping sizes 2" and smaller shall be screwed type. Joints in piping sizes 2 ½" and larger shall be welded with flanges at valves.
 2. Connections to gas-fired equipment, such as furnaces, shall include gas cock, drip leg and union and be rigid as detailed above.
 3. Piping outside of building and routed below grade shall be Schedule 40 (API SL) polyethylene and shall conform to the requirements of thermoplastic pipe as outlined in ANSI 31.8 for gas transmission. Riser to regulator and extending five feet horizontally below grade shall be black steel pipe with asphalt based coating and plastic jacket as Extru-coat. All gas service piping into any structure shall be electrically grounded per code.
- E. Refrigerant Piping
1. Piping shall be Type "L" ACR copper with brazed joints. All joints, fittings and piping shall be brazed connection type. No flared or compression piping accessories allowed except at equipment connections.
- F. Equipment Utility and Relief Drain Piping
1. Indoor water heater T & P, backflow preventer and miscellaneous equipment relief and drain piping shall be full size connection Type 'L' copper with solder joints.
 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings.

2.2 PIPE FITTINGS, UNIONS, FLANGES, AND GASKETS

- A. All fittings shall conform to pipe as to black steel, galvanized steel, copper, PVC or cast iron, etc. or as indicated. Fittings and accessories shall have equal or greater pressure rating than piping specified for particular application.
- B. Malleable steel fittings shall be minimum 150 psi class.
- C. Steel pipe unions shall be malleable iron having bronze to iron ground joints.
- D. Steel nipples shall be extra heavy type. All thread nipples prohibited. Provide a minimum of 1" of bare pipe between threaded ends of nipples.
- E. Flange bolts: Galvanized Alloy steel, ASTM #A 196, Galvanized GR. B 7; nuts' ASTM #S 194, GR. 2 H; both hex head style.
- F. Flange gaskets serving piping below 250 degrees F shall be synthetic composition type; serving above 250 degrees F gaskets shall be corrugated metallic type. Utilize gasket suitable for service intended.
- G. Couplings, steel pipe malleable iron, Grade II.
- H. Provide factory made reducers and increasers, and nipples of comparable materials as the piping. The use of bushings is not acceptable to obtain reduction or increase in sizes.
- I. Galvanized steel pipe shall be assembled with galvanized screw fittings unless specifically indicated otherwise.

2.3 DIELECTRIC FITTINGS

Provide where copper and ferrous metal are joined.

- A. 2-inch and less: Threaded dielectric union.
- B. 2 ½-inch and larger: Flange union with dielectric gasket and bolt sleeves.
- C. Temperature Rating, degree F: 210 for water systems.

2.4 BEDDING AND BACKFILL MATERIALS

- A. Type S1 – Select Fill
 - 1. Material shall consist of select, non-organic, debris-free silty clays or sandy clays with no more than 55 percent fines passing a No. 200 sieve.
 - 2. The plasticity index shall be within the range of 8 to 20.
 - 3. The liquid limit shall be less than 40.
- B. Type S2 – Course Aggregate
 - 1. Material shall consist of washed stone free of shale, clay, friable material, sand and debris.
 - 2. The aggregate shall be graded in accordance with ANSI/ASTM C33, size number 467.
- C. Type S3 – Pea Gravel
 - 1. Material shall consist of natural stone free of shale, clay, friable material, sand and debris.

2. The material shall be graded to be between a minimum of 1/4" and a maximum of 5/8" in size.
- D. Type S4 – Sand
1. Material shall consist of natural river or bank sand, washed free of silt, clay, or organic matter, loam friable or soluble materials.
 2. The material shall be graded in accordance with ANSI/ASTM C33.
- E. Type S5 – Crushed Stone
1. Crushed limestone, No. 610 gradation.
- 2.5 BEDDING AND BACKFILLING MATERIAL QUALITY CONTROL
- A. Tests and analysis of soil material shall be performed in accordance with ASTM D4318 or ASTM C136.
 - B. Materials tested which do not meet the specified requirements shall be removed and replaced with acceptable material at no cost to Owner.
 - C. Maximum dry density of the soil materials shall be determined by ASTM D698 and field density of in-place materials by ASTM D2922.

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

- A. General
1. Arrange and install piping approximately as indicated, straight, plumb and as direct as possible; form right angles or parallel lines with building walls. Keep pipes close to walls, partitions, ceilings, offset only where necessary to follow walls as directed. Locate groups of pipes parallel to each other; space them at distance to permit applying full insulation and to permit access for servicing valves. The PROFESSIONAL reserves the right to require this CONTRACTOR to make minor changes in pipe locations where conflicts occur with other trades or equipment. Such changes shall be made without extra cost to OWNER.
 2. Install horizontal piping as high as possible without sags or humps. Grade drainage piping at uniform slope of 1/8" per foot minimum and maximum 1/4" per foot, or as noted. Where this is impossible, maintain slope as directed, but in no case less than 1/16" per foot. Pitch piping in direction of flow.
 3. When piping is cut, it shall be reamed with pipe reamer and all burrs, scale, trash and foreign matter removed. If any piping is found installed without being reamed, cleaned, deburred, etc., or in any way contrary to above, it shall be sufficient reason for related erected piping to be removed, inspected by the PROFESSIONAL, corrected and reinstalled, all at CONTRACTOR'S expense.
 4. Where size changes on horizontal lines, use reducing fittings; bushings are prohibited. On liquid lines have eccentricity down, hold the top level. On gas or vapor lines have eccentricity up, hold the bottom level.
 5. Sufficient space shall be allowed in erecting piping for proper application of

thermal installations including fittings. In no case shall any insulation be cut or reduced thickness because of inadequate space.

6. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping.
7. Locate valves for easy access and operation. Concealed valves shall be provided access doors. Do not locate any valves with stems below horizontal.
8. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
9. Furnish and install unions or mating flanges at all connections to each piece of equipment conveniently located to facilitate quick and easy disconnecting of equipment. Flanges or union connections shall be used on both sides of traps, control valves, pressure reducing valves and meters and the like.

B. Steel Piping

1. Where piping is threaded, dies shall be clean and sharp. Threads shall conform to ANSUI B2.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads or steel pipe with joint compound and red lead paint for corrosion protection. The caulking of these joints will not be tolerated. Pipe joint compound must be approved by the PROFESSIONAL.
2. Where welding is specified or done, it shall be by electric arc by mechanics skilled in operation and holding a test certificate acceptable to the ENGINEER. All scale and flux shall be removed from piping after welding. Welding, beveling, spacing and other details shall conform to ANSI B31.1.

C. Plastic Piping

1. Install all fittings and joints as per manufacturer's recommendation.
2. Utilize purple pipe cleaning compound on all solvent weld joints.
3. Utilize manufacturer's recommended colored (non-purple) solvent glue on all solvent weld joints, unless manufacturer's installation instructions do not allow or if solvent glue is not rated for specific application.
4. Install all underground plastic and fiberglass glass piping outside building perimeter with tracer identification tape (per Section Mechanical Identification) and minimum 12-gauge bare copper wire for future location reference.

D. Copper Piping

1. Copper tubing shall be thoroughly reamed, cleaned with steel wool or emery cloth and a non-corrosive flux used before soldering or bracing.
2. Copper tubing shall be thoroughly reamed and de-burred before joining with specialty piping systems such as Viega "Pro-Press".

3. Where solder joints are specified, use solder having 95% tin and 5% antimony. Each roll of solder shall be clearly stamped as to grade and content.
 4. Where brazing joints are specified, use a brazing filler metals having a melting point above 1100 degrees F and containing at least 5% silver.
 5. Where copper tubing extends through concrete slab on grade, tubing shall have an "Armaflex" or "Rubatex" type.
 6. Provide PVC isolation wrap where copper pipe extends through masonry walls to connect plumbing fixtures or valves, etc.
- E. Refrigerant Piping
1. Braze joints in the presence of an inert gas.
 2. Verify pipe size and configuration and provide same based on HVAC equipment manufacturer's recommendation to provide scheduled capacity, performance and maximize equipment life.
 3. Refrigerant piping systems shall be installed in accordance with applicable chapters of the ASHRAE "Applications" handbook. Particular attention shall be given to suction gas, velocities and requirements for liquid sub cooling.

3.2 PIPE EXPANSION

- A. In the installation of all pipe runs where shown or where necessary, install swing joints, flexible couplings, turns, expansion loop or long offsets to allow for expansion. Broken pipe or fittings due to rigid connections must be removed and replaced at no additional cost to the OWNER.
- B. All lines shall be securely anchored where required. Where such anchors occur, they shall be securely fastened to the steel or concrete structure of the building in a manner approved by the PROFESSIONAL. Drawings shall be submitted before installation.

3.3 ANCHORS

Plastic pipe shall be jointed to steel systems with flanges. Steel system shall be anchored within five (5') feet of connection point to eliminate any thrust, stress, or torque from steel system to fiberglass and/or plastic system.

3.4 THRUST BLOCKS

All changes in direction of fiberglass or plastic pressure systems for 2" and larger systems shall be encased in concrete (3000 psi) thrust blocks to provide anchor points for direct expansion and contraction.

3.5 TESTS

- A. Cooperation/Scheduling:
- The ARCHITECT shall be notified no less than ninety-six (96) hours prior to any pipe test. The ARCHITECT shall also be notified in adequate time for an inspection of the test before the test is completed. The PRIME CONTRACTOR'S Superintendent shall be responsible for administering and witnessing all tests, log it for permanent record and transmit to ARCHITECT at completion of project.

CONTRACTOR shall refer to and make additional copies of the "Pipe Test Log Form" at the end of this section to use as standard test log forms. The PRIME CONTRACTOR'S Superintendent shall keep this on-going log on jobsite and shall include the following:

1. Date of Test
 2. Duct/Piping Description (EX: "Sanitary Sewer")
 3. Location (EX: "Northwest Quadrant First Level")
 4. Results (EX: "Held 10 ft. of head for eight hours without leakage", etc.)
- B. Tests shall be as follows: (New and Existing Modified Piping shall be tested and all leaks repaired)
1. Gravity Flow Sanitary Waste and Vent piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
 2. Gravity Flow Condensate Drain piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
 3. Water Piping: (Domestic and circulating systems) 125 psi hydrostatic or 100 psi air, in conjunction with manufacturer's recommendations, with no discernable pressure loss for a period of eight (8) hours. Potable water piping shall be pressurized with water or air during all phases of construction such that leaks can be promptly identified and remedied.
 4. Natural Gas Piping: All gas piping shall be tested at twice the operating pressure, but not less than 30 psig, with compressed air or nitrogen, with no discernable pressure loss, for a period of not less than eight (8) hours. Oxygen shall not be used. All factory coated and wrapped piping below grade to be tested and proven tight with Holiday Leak Detector. All new and/or modified piping shall be tested to a minimum of 1.5 times the operating pressure or a minimum of 3 psig, whichever is greater.
 5. Refrigerant piping: 450 psig nitrogen for 8-hour period unless more stringent requirements are recommended by the equipment manufacturer. Test piping with all piping accessories such as charging valves and filter/driers in place, unless not recommended by equipment manufacturer's installation instructions. Refrigerant piping shall be left with minimum 60 psi pressure during all phases of construction such that leaks can be promptly identified and remedied.

3.6 SYSTEM CLEANING, TREATMENT AND PROTECTION

- A. Potable Water System: All new and modified existing potable water lines shall be thoroughly flushed and sterilized with a solution containing not less than 50 ppm available chlorine for eight (8) hours. During sterilization, operate all valves, faucets, etc., so that all portions of the system are reached. Flush system with clear water until concentration drops to 0.5 ppm. CONTRACTOR shall furnish sample to State

Health Department attesting to satisfactory condition of water. Submit copy of test reports to ARCHITECT near end of project and prior to OWNER'S use of potable water distribution system.

3.7 BELOW GRADE PIPING INSTALLATION

A. Preparation

1. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.
2. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the PROFESSIONAL will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
3. Appropriate traffic control devices shall be provided in accordance with federal, state, or local regulations to regulate, warn, and guide traffic at the work site.
4. Trees, shrubs, fences, and all other property and surface structures shall be protected during construction unless their removal is shown on the Contract Drawings and Specifications or approved by the OWNER.

B. Excavation

1. During excavation, material meeting the Type S1 requirements shall be stock piled in an orderly manner and at a sufficient distance from the banks of the trench to avoid over-loading and to prevent slides or cave-ins. Submit test reports to verify soil properties.
2. All excavated materials not required or suitable for backfill shall be removed and disposed of off-site at CONTRACTOR's expense.
3. Excavation and trenching shall be performed to allow utilities to be installed to lines and grades established by the Contract Drawings and Specifications with fittings and valves at the required locations unless otherwise approved by the PROFESSIONAL.
4. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified.
5. Excavated material shall be placed in a manner that will not obstruct sidewalks, driveways, or other structures.
6. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures and utilities.
7. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 9 inches below and on each side of all pipe, valves, and fittings. The same shall also be performed when pieces of concrete or masonry and other debris or subterranean structures, such as

masonry walls, piers, or foundations are encountered during excavation.

8. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the PROFESSIONAL to prevent future damage or contamination of either structure.
9. Removal of pavement and road surfaces shall be a part of the trench excavation and the amount removed shall depend upon the width of trench required for the installation of structures. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe and other structures by more than 6 inches in any direction unless required or approved by the OWNER.
10. Should the trench pass over a sewer or other excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.
11. Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the CONTRACTOR. All properties that have been disturbed shall be restored as nearly as practical to their original condition.
12. When the sub grade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 12 inches below the pipe level and backfilled up to original trench depth with Type S1 material.
13. Ditches shall be kept free of water during piping installation. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Discharge from any trench dewatering pumps shall be conducted to natural drainage channels, storm sewers, or an approved reservoir.

C. Bedding and Backfilling

1. General Requirements:
 - a. The trenches shall not be backfilled until the installation conforms to the requirements specified.
 - b. Do not install backfill over porous, wet, frozen or spongy sub-grade surfaces.
 - c. In areas where less than 16" of ground cover exists, the piping shall be encased in concrete. Concrete shall be minimum 3000 PSI with reinforcing as indicated or required. Backfill shall be provided above concrete to original grade or sub-grade.
 - d. Pavement, base course, and compacted sub grade disturbed by trenching operations shall be replaced in an acceptable manner with

materials equal to the adjacent compacted sub grade, base course, and pavement for a minimum distance of 12 inches on each side of the trench.

- e. If compaction tests indicate Work does not meet specified requirements, CONTRACTOR shall remove Work, replace and retest until specified requirements are met.
2. Bedding and Backfilling Requirements:
 - a. Bedding shall be provided for all piping, valves, etc.
 - b. Bedding material shall be either Type S3 or S4.
 - c. Bedding shall extend from 4" below bottom of pipe to 12" above top of pipe.
 - d. Backfill shall extend from 12" above top of pipe up to top of trench or original grade/sub-grade.
 3. Placement and compaction of bedding and backfilling materials under roads, parking areas, etc. shall be performed as follows:
 - a. Place materials in continuous 6" thick horizontally placed loose layers and compact to 98% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
 - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
 - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.
 4. Placement and compaction of bedding and backfilling materials under grassy areas, sidewalks, etc. shall be performed as follows:
 - a. Place materials in continuous 9" thick horizontally placed loose layers and compact to 95% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
 - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
 - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.

PIPE TEST LOG							
DATE	SYSTEM	LOCATION OF TEST	TEST PRESSURE	LENGTH OF TEST	RESULTS	CONTRACTOR'S SUPERINTENDENT WITNESS INITIALS	
						PRIME	MECHANICAL

Note: Turn in all forms filled out with project closeout documentation. Copy this form if more sheets are needed. These forms and/or log shall be kept at jobsite and upon request made available to ARCHITECT and/or PROFESSIONAL.

END OF SECTION

SECTION 200100 - VALVES**PART 1 – GENERAL****1.1 SCOPE**

Provide all material, equipment and labor, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.2 APPLICABLE STANDARDS

Insofar as possible, all valves of the same type shall be of the same manufacturer.

1.3 VALVE DESCRIPTION AND IDENTIFICATION

- A. Valves shall have name or trademark of manufacturer and working pressure cast or stamped on valve body.
- B. Valve hand wheels shall be oriented when installed to provide maximum accessibility for operation.
- C. Valve discs shall be the manufacturer's standard material for the service in which the valve is used unless otherwise indicated under the individual type valve specification.

PART 2 PRODUCTS (OTHER VALVES FROM THOSE LISTED MAY BE SUBMITTED FOR APPROVAL)**2.1 VALVES FOR DOMESTIC WATER APPLICATIONS**

- A. All valves shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
- B. Ball Valves:
 - 1. Valves 2" and smaller shall be two-piece brass or stainless-steel construction, 1-1/4" extended neck, chrome plated ball with full port, P.T.F.E. seals and seats. Heavy duty steel handle with vinyl grip, quarter turn operation. Valves shall be suitable for working pressure of 200 psig and maximum 250deg F.
 - 2. Valves 2-1/2" and larger shall be same as above except that two or three-piece brass or stainless-steel construction may be utilized.
- C. Silent Check Valves:
 - 1. Silent check valves 2" and smaller shall be horizontal or vertical silent spring check type. Valves shall be rated for 200# WOG.

2.2 VALVES FOR NATURAL GAS SYSTEM

- A. Plug Valves (for sizes 1 1/4" and larger, and at main service valves):
 - 1. Valves shall be iron body (semi steel) lubricated, bolted glad type with Teflon coated plug. Flange unit for installation between 150# ASA steel flat-faced slip on weld flanges. All valves shall be wrench operated and wrench shall be furnished with each size valve. Each plug valve shall be serviced with the silicone sealant/lubricant recommended by the valve manufacturer. Valves 2" and smaller shall be short pattern type with threaded end connections. Valves shall be rated at 175# WOG.

2. Valves shall be equal to:
 - a. Nordstrom Fig. 142
 - b. Walworth No. 655
 - c. Powell No. 2200
- B. Ball Valves (for sizes 1" and smaller)
- C. Valves shall be one quarter turn shut-off, listed for gas service, bronze construction, CSA B16.44 5 psig rated, UL 842 5 psig rated and ANSI Z21.15 ½ psig rated.
- D. Provide lever handle for equipment connections equal to McDonald Model 10710.

2.3 CHROME PLATED VALVES

Valves in exposed domestic plumbing connections to equipment shall have chrome plated finish.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be such that the valve can be fully opened and have at least 6" clearance beyond valve stem handle and sufficient clearance to remove stem for repair.
- B. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawings. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.

3.2 DISCHARGE FROM SAFETY AND/OR RELIEF VALVES

Relief valves relieving steam, gas of any type, including compressed air, or liquid above 120 degrees F., shall be piped full size to outside building or as indicated so that discharge cannot hit any person or structure.

3.3 RELIEF VALVE CAPACITY

Valve relieving capacity shall meet all code requirements and also be equal to at least 1.25 of possible heat input to be relieved.

END OF SECTION

SECTION 200120 - PIPING SPECIALTIES

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Piping specialties to connect fire protection and plumbing equipment.

PART 2 – PRODUCTS

2.1 BACKFLOW PREVENTERS

- A. Install a backflow prevention device at main service entrance for potable water and at any point in the domestic water system where the potable water supply comes in contact with a potential source of contamination. Devices shall be certified by a recognized testing laboratory and be AWWA C-511-89 FCCCHR of USC, UPC, and IPC compliant. Listed below is a partial list of connections to the water system which shall be protected against backflow or back siphonage.

- 1. Atmospheric Vacuum Breaker:
 - a. Hose bibbs and sink faucets w/threaded outlets.

2.2 THERMOMETERS

- A. Light powered, liquid crystal display, °F or °C selector switch and 6” brass stem with adjustable angle as required to read display from eyelevel.
- B. Separable Socket (Well): Brass, extension neck type to clear pipe insulation.
- C. Scale range may be slightly greater than shown to meet manufacturers' standard. Required ranges in degrees F:
Domestic Water.....30 to 180
- D. Equal to Weiss Instruments, Inc “Digital Vari-angle” or Weksler “AAD” series.

PART 3 – EXECUTION

3.1 INSTALLATION

All equipment shall be installed as per manufacturer's recommendation and applicable codes and standards. Provide appurtenances as required for a complete system. Provide all appurtenances as indicated on Contract Drawings, where specified or not.

END OF SECTION

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SECTION 200140 - SUPPORTS AND ANCHORS**PART 1 – GENERAL****1.1 SCOPE**

Provide all labor, equipment, material, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.2 SUPPORT

Supports shall be installed in one of the following methods: (1) from wood using coach screw on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. All hangers, rods, and inserts shall be Underwriters' Laboratories approved for the service intended and meet MSS #SP 58 and 69.

PART 2 – PRODUCTS**2.1 HANGERS, SUPPORTS, ANCHORS AND GUIDES**

- A. All hangers, fasteners and accessories exposed to view indoors shall be galvanized or zinc plated. Similar installations outdoors shall be hot dipped galvanized materials and fasteners.
- B. Supports, hangers, anchors and guides shall be provided for all horizontal and vertical piping. Selection and application shall be in accordance with ANSI/MSS SP-69.
- C. All pipe supports shall be of type and arrangement hereinafter specified. They shall be so arranged as to prevent excessive bending stresses between supports. Specifically designed hangers shall be fabricated and installed in accordance with ANSI/MSS SP-69.
- D. All bracket clamp and rod sizes indicated in this specification are minimum size only. The CONTRACTOR under this section shall be responsible for structural integrity of all supports. All structural hanging materials except variable spring units shall have a safety factor of 5 built in.
- E. All piping routed on trapeze hangers shall be attached rigidly to same unistrut hanger bar with clamps designed by unistrut manufacturer as approved by PROFESSIONAL. Insulated piping clamps shall encapsulate piping, insulation and saddle.

2.2 BASES AND PADS

- A. Concrete equipment pads shall be constructed of minimum 3000 psi reinforced concrete. Provide $\frac{3}{4}$ " chamfer on all exposed top perimeter edges of pads.
- B. Top of equipment pads outdoors shall be minimum 3" above and below worst case finished grade and be reinforced and of a strength suitable for application.
- C. Pads shall be provided in the following applications:
 - 1. Air conditioning equipment outside building. Size pads to extend from building perimeter and extend minimum eighteen (18) inches around

equipment on remaining three sides, or as indicated.

2. Backflow preventer enclosures outside building. Size pads to extend minimum twelve (12) inches around equipment on all sides, or as indicated.
3. Floor mounted water heaters, air handling units, boilers, pumps, and where shown or specified on Drawings.
4. Provide similar concrete surrounds at cleanouts, grease interceptors, wet wells, etc., and as indicated.

PART 3 – EXECUTION

3.1 PIPING SUPPORT

- A. All hangers for insulated piping shall be sized to accommodate insulation and shield. No hangers for insulated piping may be installed directly below or onto pipe itself except domestic cold water, and condensate drain piping where insulation is for condensation and/or freeze protection only.
- B. Provide hanger spaced per International Plumbing Code, International Fuel Gas Code, and International Mechanical Code requirements for piping type and size.
- C. Support horizontal PVC pipe with hanger or pier, located close to hub; use one support for each pipe length, or every other joint, whichever is closer. Where maintenance requirements may impose torque, as at a cleanout, support on both sides of torque point.
- D. Provide hanger within 18" of each elbow, also provide hanger with 18" of connection to each piece of equipment.
- E. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5' intervals or midway between floors, whichever distance is shorter.
- F. Provide PVC or other approved coating for steel, cast iron or PVC pipe riser clamps. See applicable details.
- G. Pipes passing thru walls shall not bear on building construction. Provide sleeves and fire proofing sealant as per Section *Basic Mechanical Materials and Methods*.
- H. Maximum weights on hanger rods assuming a maximum operating temperature of 450 degrees F. shall be such that stress in tension shall not exceed 9000 psi, using root area of threaded portion.
- I. For copper pipe, supports shall follow schedule and specifications. Supports for uncovered lines shall be especially designed for copper tubing, and shall be of exact O.D. diameter of tubing and shall be copper plated.
- J. Shields at Hangers: Insulated pipe shall be protected at the point of support by a 180 degree insert of high density, 100 psi, waterproofed calcium silicate encased in a 180-degree galvanized sheet metal inverted saddle. Insert to be same thickness as gauges shown in chart below. Insulation insert to extend 1" beyond sheet metal on all insulated water lines. If pipe hanger spacing exceeds 12 feet, use double layer sheet metal shields. Check Section *Mechanical Insulation* for Alternatives.

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2" - 2"	8"	24
2-1/2" - 4"	12"	20
6" - 8"	16"	16

- K. Provide all steel required for support of pipes and equipment other than steel shown on STRUCTURAL ENGINEER'S Drawings.
- L. All pipe supports shall be designed to avoid interferences with other piping, hangers, electrical conduits and supports, building structures and equipment.

3.2 OTHER MOUNTINGS

- A. Any piece of equipment installed in a finished ceiling or wall area shall be supported independently of the building finish. Ceiling mounted items shall be supported directly from the building structure.
- B. Support piping from structural steel members by malleable iron or formed steel beam clamps. Where suspended from concrete slabs, install inserts of malleable iron during building construction.
- C. Wire or perforated hangers will not be permitted. Provide adjustable split ring swivel malleable iron hangers for horizontal runs up to and including 3" pipe size. Provide adjustable steel clevis type hangers for pipes over 3".
- D. Provide malleable iron split ring hanger with copper finish and copper plated malleable iron adjuster for use with copper piping. For insulated piping, provide hangers sized to accommodate insulation.

END OF SECTION

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SECTION 200170 - ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 MECHANICAL WORK

All work performed under this Contract shall be in accordance with Division Electrical.

PART 2 – PRODUCTS

2.1 STARTERS

- A. For each and every motor provided by CONTRACTOR, a new proper motor starter shall be furnished for installation, except that all starters for ½ horsepower single phase and smaller motors as specified and/or required shall be manual type.
- B. Heaters shall be of the melting alloy type, sized to the exact nameplate running current of the motor. Manually operated motors with magnetic controllers shall be provided with oil tight pushbutton stations and automatically controlled motors shall be provided with oil tight "hands off auto" automatic switches. All magnetic starters shall be provided with red bull's eye pilot light in cover. Energy for controlled circuits shall be taken from the load contacts from the starters. All power wiring and control wiring shall be run in rigid conduit in damp locations or electrical metallic tubing in dry locations, and shall conform to NEC Standards. Provide two sets each of normally open and normally closed auxiliary contacts for all magnetic starters.
- C. For all starters for three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- D. For manual and automatic controlled operation of 3/4 HP and larger motors, furnish magnetic motor starter with:
 - 1. Maintained contact starter with "hand off auto" switches.
 - 2. Trip free, thermal overload relays.
 - 3. Capable of accepting 3 external electric interlocks.
 - 4. "Red" run pilot bulb indicator.
- E. Where interlock or automatic operation is specified, regardless of HP, provide magnetic starter complete with "run off auto" switch so connected that in "run" or "auto" all safety controls shall stop the motor. Provide number and type of auxiliary normally open and/or closed contacts as required by specified control sequence.
- F. Size 2 and larger starters shall have control circuits individually fused from line side of starter, or lead side of breaker, on combination unit. Starters on service above 240 volts shall have 120 volts, built in control circuit transformer fused from line side.
- G. Each electrically operated item of equipment shall be suitable for proper operation on the electrical supply to which it is to be connected as directed on the Electrical Drawings. Prior to delivery on job site, it shall be the responsibility of the CONTRACTOR and any Sub-Contractors, equipment suppliers, etc. to determine from the Electrical Drawings the characteristics of the electrically operated item, and to furnish each item accordingly. CONTRACTOR shall pay the cost due to any modifications resulting from differences as compared to Basis of Design products.

- H. Provide soft start and soft stop magnetic motor starters for all motor three phase loads above 5 HP, as Magnetek Series RVS–DN with digital microprocessor circuitry, and include the safeties as detailed above, with auto reset.

2.2 MOTORS

- A. All motors under this Contract shall be provided with thermal overload protection.
- B. Equipment shall operate properly under a 10% plus or minus voltage variation, and a 5% plus or minus frequency variation.
- C. Unless noted otherwise, motors shall be squirrel cage induction type with ball bearings. Motors ½ HP and smaller shall be 120 volts, single phase, with permanently lubricated bearings; ¾ HP and larger shall be 3-phase, Design "B" or "C", drip proof type, of minimum power factor and energy efficiency as listed herein.
- D. Motors shall be premium efficiency type as defined by energy policy act of 1992 (EPACT) and latest version of IEEE Standard 112, Test Method B.

HP	EFFICIENCY	POWER FACTOR
1	84	72
1.5	85.5	73.5
2	85.5	70.6
3	89.5	77.5
5	89.5	81
7.5	91.7	78.9
10	91.7	83
15	93	81
20	93.6	84
25	93.6	83.5
30	94	85.1
40	95.5	76
50	95.5	84.2
60	95.5	84.5
75	96	83.4
100	96	84.4

- E. Motors shall be rated for continuous, full load duty and capable of withstanding momentary overloads of 50%. Select motors so actual load does not exceed nameplate ratings, and does not use motor "service factor". All motor furnished for this project shall have minimum service rating factor of 1.15. All motors shall be highest energy efficient type for all mechanical applications.
- F. Except where interlock or automatic control is required, single speed single phase motors, ½ HP and smaller shall have manual motor switch with pilot light and thermal overload protection.
- G. Each motor to be installed outdoors shall be of the totally-enclosed fan-cooled type, or housed in a weatherproof housing. Motors for hazardous locations shall be properly furnished to suit application.

- H. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratios or the load characteristic dictates, the multispeed motors shall be separate winding types. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed and rated for this duty.

2.3 ELECTRICAL FOR EQUIPMENT

- A. Motor controllers, protection devices, etc., for control and protection of equipment shall be furnished with the equipment, but installed and electrically connected to power source under Division Electrical.
- B. NEMA Standards shall be taken as minimum requirements for Electrical equipment.
- C. CONTRACTOR shall provide and install all disconnects for all MECHANICAL motors and loads unless equipment is provided with integral disconnect(s).
- D. All three phase motors in occupied areas shall be "quiet" rated and so marked.
- E. On all three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- F. Suitable enclosures for all electrical equipment shall be provided to suit environment as per NEMA and NFPA standards.
- G. Clearances of 36" shall be maintained around equipment less than 400V. Clearances of 48" shall be maintained around equipment greater than 400V.

PART 3 – EXECUTION

3.1 GENERAL

- A. Where electrical voltage and phase characteristics are specified hereinafter, verify them with the Electrical Drawings. In case of discrepancy between the Specifications and the Electrical Drawings, the Electrical Drawings shall govern.
- B. The CONTRACTOR shall provide power to all circuits, controls, and safety devices to every piece of mechanical equipment specified or shown on Drawings whether a power source is indicated or not on Electrical Drawings.
- C. The CONTRACTOR shall provide and extend fire alarm connections to all larger air handling equipment and provide code required smoke/heat detection sensors, etc., and automatic shutdown in the event of positive fire/smoke detection from any fire alarm sensor in same zone as served by same air system.
- D. Control wiring (120V. and less) shall be provided under *Division 20, 22 and 23* and extended from the 120V. power circuits indicated on the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.

END OF SECTION

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SECTION 200190 - MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 SCOPE

- A. Piping System Identification
- B. Valve Identification System
- C. Equipment Identification
- D. Miscellaneous Identification

1.2 REFERENCES

ANSI A13.1 – Scheme for the Identification of Piping Systems

PART 2 – PRODUCTS – SPECIFIED AS PER INDIVIDUAL APPLICATION IN PART 3

PART 3 – EXECUTION

3.1 IDENTIFICATION OF PIPING SYSTEMS

- A. Identify all pipe after final painting and/or insulation with manufacturer's preprinted labels at the following minimum locations:
 - 1. Straight runs of piping with a maximum spacing of twenty (20) feet.
 - 2. Adjacent to each valve.
 - 3. Adjacent to each branch takeoff point.
 - 4. On each side of where piping passes through walls/floors.

- B. Letter shall be sized in accordance with the following:

OUTSIDE DIAMETER OF PIPE COVERING	MINIMUM WEIGHT OF LEGEND LETTERS
Up to 3/4"	1/2"
1" to 1-1/4"	3/4"
1-1/2" to 2"	1"
2-1/2" to 6"	1-1/2"

- C. At each legend, include a manufacturer's label with an arrow to show normal flow.
- D. Identify location of outside underground piping by: (1) 4" x 18" concrete stakes, flush with finish grade, located above lines at end and/or corners or (2) by 2" x 2" brass plates embedded in building walls above pipes.
- E. Identify all non-metallic piping below grade with 2" wide metalized tracer continuous roll identification tape, with service, as Brimar Industries "Underground Tape 2" Detectable". Install tape ± 12" below finished grade directly atop buried pipe, and 12-gauge bare copper tracer wire taped continuously to top of piping service. All tracer tape/wire shall be extended continuously between concrete stakes, and tied to stakes ± 6" below finished grade.

3.2 IDENTIFICATION OF PIPING ABOVE GRADE

- A. All piping exposed to view or concealed shall include manufactured labels on pipe in

a visible location. Label shall be attached to pipe every twenty feet (20'). Labels shall be installed after piping has been insulated.

- B. Labels to be utilized as follows.
1. In exposed applications, CONTRACTOR shall utilize pre-coiled, snap in place type markers as Seton "Setmark". On 6" and larger pipe, CONTRACTOR shall utilize nylon ties to secure marker to piping.
 2. In concealed applications, CONTRACTOR shall utilize a pressure-sensitive tape manufactured legend on all installations. Tape shall be tamper resistant vinyl tape for indoor as Seton "Opti-Code" and outdoor installations as Seton "Ultra-mark."
 3. Tape legend colors shall meet ANSI recommendations.
 4. On piping where markers do not include directional arrows, CONTRACTOR shall include similar manufactured stick-on flow arrows on all pumped circulating systems as Seton "Arrows On A Roll" with colors to match pipe legend tape identification.

3.3 EQUIPMENT IDENTIFICATION

- A. All equipment, starters, controls panels, switches, thermostats, humidistats and other control devices shall be permanently labeled with equipment being served. Equipment labels shall correspond to those shown on the Contract Documents.
- B. Individual functions and equipment on indicators and controllers on control panels shall be clearly permanently identified. Color code of labels, marking and identification shall be approved by PROFESSIONAL. This applies to the HVAC system, override panel, microprocessor time clocks and specialty annunciation specified in Section Controls and Instrumentation.
1. Labels for equipment, starters and control panels shall be phenolic type with minimum 3/4-inch tall engraved lettering.
 2. Identification for individual controls devices including thermostats, humidistats, relays, switches, etc. shall be labeled with either phenolic type with minimum 1/2-inch tall engraved lettering or stick-on type from lettering machine.
- C. A reduced scale floor plan drawing with all devices referenced to the equipment served shall be framed and mounted where directed. A copy of this reduced scale floor plan drawing shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual.

END OF SECTION

SECTION 200240 - MECHANICAL SOUND AND VIBRATION CONTROL

PART 1 – GENERAL

1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

1.2 APPLICABLE STANDARDS

- A. ASHRAE, 2019 HVAC Applications Handbook, Chapter 49, "Noise and Vibration Control".
- B. The CONTRACTOR shall be responsible for providing and installing vibration isolation of the appropriate type and size for proper weight loading to meet the requirements of the specifications, and in accordance with instructions of the equipment manufacturer or vibration isolator manufacturer or its vendor.
- C. On completion of the work, the ENGINEER shall carry out an inspection and shall inform the installing CONTRACTOR of any further work that must be completed before final approval is obtained.

1.3 MANUFACTURER

- A. All vibration isolators shall be supplied by a single approved manufacturer.
- B. The manufacturer's standard vibration isolation will be acceptable only if it meets this specification.

1.4 VIBRATION AND SOUND CONTROL

- A. All rotating equipment shall be isolated from correcting piping, ductwork, structure or other rigid utilities, etc., by means of the appropriate vibration isolation. The CONTRACTOR shall provide and install the appropriate vibration isolation on any equipment, etc., with moving parts, whether indicated on Plans or not.
- B. The CONTRACTOR shall provide and install appropriate sound isolation as required to restrict sound production or transmission. CONTRACTOR shall install this insulation, baffle, etc., where indicated or as directed by ENGINEER.

PART 2 – PRODUCTS

2.1 VIBRATION ISOLATOR TYPES

- A. Unit FN (Floor Neoprene) - Smaller floor mounted equipment and for spacing between equipment and drain pans.
 - 1. These isolators shall be double deflection neoprene waffle pad. Pads shall be a minimum of 5/16" thick with size cut as required for particular equipment weight being supported.
 - 2. Isolators shall be Mason Type W – Neoprene Waffle Pads or approved equal.

2.2 EXTERIOR METAL PARTS

- A. All metal parts of vibration isolation units installed out of doors shall be hot dip galvanized after fabrication.

- B. Galvanizing shall comply with ASTM A123, A153 and 386 as applicable.
- C. At the time of shipment to the job site, submit to the CONTRACTOR with copy to the ENGINEER, a certified statement by the galvanizer indicating conformity of galvanizing to ASTM Specification.

PART 3 – EXECUTION

3.1 GENERAL

- A. Minimum static deflection of each vibration isolator unit shall be as shown in the equipment schedules and/or as described for each specific piece of equipment in these Specifications.
- B. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment.

3.2 EQUIPMENT MOUNTING

- A. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.
- B. Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the equipment and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked by the CONTRACTOR to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
- C. All wiring and other connections to vibration-isolated units shall be made flexible in order to avoid short-circuiting the isolators. A minimum 4-foot length of armored flexible conduit or cable installed in the shape of a U is acceptable for electrical connections. In the case of large diameter conduits, a sheet metal duct with flexible connection may be used for conduit connections to vibrating equipment. Flexible material shall be the same as that described for ducts connecting to fans.
- D. Under no conditions shall piping, ductwork or conduit be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.
- E. Vibration isolation hangers shall be positioned so that hanger housings may rotate a full 360 degrees without contacting any object.

3.3 DUCTS

- A. The AHU returns, OSA, and discharge shall be connected to the ductwork with a flexible connector as described below, in order to prevent short-circuiting, and for sound and vibration isolation. Weatherproofing material shall be utilized when installed on exterior installations. Install connectors with slack, avoiding tight or misaligned connections.
- B. All other ducts connecting fans, etc., shall have a flexible connector as described above.

C. Flexible duct connectors shall be:

APPLICATION	METAL END CONNECTIONS	FABRIC
Split systems and fans less than 2200 CFM air delivery capacity.	Minimum 3" wide 28 gauge galvanized, as Duro Dyne "Econo Fab" Series with minimum 4" wide fabric.	Indoors: Minimum 15 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend. Outdoors: Minimum 17 oz./sq. yd., as Duro-Dyne "Therma Fab" Series with Silicon Rubber coated woven fiberglass fabric.
Larger Commercial HVAC Systems with air delivery above 2200 CFM air delivery capacity.	Minimum 3" wide 24 gauge galvanized, as Duro Dyne "Super Metal Fab: Series, with minimum 6" wide fabric.	Indoors: Minimum 22 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend. Outdoors: Minimum 24 oz./sq. yd. As DD "Durolon" Series with Hypalon coated woven fiberglass.

END OF SECTION

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SECTION 200250 - MECHANICAL INSULATION

PART 1 – GENERAL

1.1 SCOPE

- A. It is intended that all heating and/or air conditioning ductwork, all storm drain piping above slab on grade and all domestic water piping above slab on grade throughout this project be insulated, except as specifically stated otherwise hereafter.
- B. Insulation shall include all insulating materials their applications, bands, tie wire, and weather protection for all pipe, fittings, valves, and equipment as indicated and as specified herein.
- C. Piping systems requiring insulation, types of insulation required, and insulation thickness shall be as listed herein. All fittings, flanges, and valves (except valve stems, hand wheels, and operators) in piping systems requiring insulation shall be insulated unless otherwise specified. Fitting, flange, and valve insulation shall be premolded, precut, or job fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling.

PART 2 – PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass pipe insulation (FG)
 - 1. Insulation shall have a thermal conductivity $k=0.23$ at 75 degrees F.
 - 2. Insulation shall include a white ASJ with self-sealing overlap joints and seams.
 - 3. Insulation shall be equal to Johns Manville "Micro-Lok" or approved equal.
- B. Flexible elastomeric pipe insulation (FU)
 - 1. Insulation shall have a thermal conductivity $k=0.25$ at 75 degrees F.
 - 2. Insulation shall be equal to Armacell "AP Armaflex".
- C. Phenolic (P)
 - 1. Insulation shall have a thermal conductivity $k=0.15$ (density 10 pcf nominal)
 - 2. Insulation shall be equal to Insul-Phen.
- D. PVC pipe and fitting covers.
 - 1. Pipe and fitting covers shall be 20 mill thick flame retardant PVC. Fitting covers shall be neat, tight fitting radius type.
 - 2. Pipe and fitting covers shall be equal to Zeston type 300 or approved equal.
- E. Metal Protective Jacket
 - 1. Sheet Aluminum: ASTM B209, 3003 alloy, H 14 temper, 0.016 inch thick.
 - 2. Fitting Covers: Factory fabricated from not lighter than 0.020-inch thick type 3003 sheet aluminum.
 - 3. Bands: 3/4-inch wide .007 aluminum (or .005 stainless steel..)

2.2 DUCTWORK INSULATION

- A. Rectangular Ductwork Interior Acoustical Liner
 - 1. See Section *Ductwork*.
- B. External Duct Wrap Insulation (Duct Wrap)
 - 1. Insulation shall be 2.2" thick and 3/4 pcf density fiberglass material with FSK facing. The "k" factor at 75° F., mean temperature shall not exceed 0.31 and shall meet NFPA 90A & 90B Standards.
- C. Dual Wall Round and/or Oval Ductwork Insulation
 - 1. See Section *Ductwork*.

PART 3 – EXECUTION

3.1 GENERAL INSULATION INSTALLATION REQUIREMENTS

- A. The insulation shall be applied by licensed insulation applicators and all work shall be performed in a neat and workmanlike manner.
- B. No insulation shall be applied over pipes, fittings, or other surfaces, which are not clean.
- C. Insulation shall be applied after pipes have been thoroughly tested and proven tight by the CONTRACTOR.
- D. Piping insulation thru rated walls shall be coordinated with Section *Basic Mechanical Materials and Methods* and approved pipe sleeve and fire stop with UL Listing.
- E. Insulation shall be clean and dry when installed and during the application of any finish.
- F. Install materials neatly with smooth and even surfaces with jackets drawn tight and smoothly cemented down on longitudinal and end laps.
- G. Scrap pieces shall not be used where a full-length section will fit.
- H. Pipe insulation shall be continuous through sleeves, wall and ceiling openings.
- I. A PVC grommet shall be utilized at metal stud penetrations of piping, and insulation shall be installed snug to both sides of penetration with ends of piping insulation vapor sealed if specified.
- J. Piping and ductwork shall be individually insulated.
- K. Chrome plated pipes and pipes used solely for fire protection shall not be insulated.
- L. Equipment nameplates, access plates in fan housings and ductwork and the like for ventilating and air heating systems, shall not be insulated but insulation must be carefully beveled and sealed around it.
- M. Ductwork insulation shall be continuous through sleeves, wall and ceiling openings except at fire dampers in ductwork systems.
- N. Vapor Barrier Installation
 - 1. A complete moisture and vapor seal shall be provided wherever insulation terminates against metal hangers, anchors and other projections through

insulation on cold surfaces for which a vapor seal is specified as identified in Part 3 paragraph 3.03 of this specification section.

2. Seam and fitting covers shall be sealed with two (2) generous brush coat of fire resistant vapor barrier coating, applied at all longitudinal and circumferential laps.
3. Ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints at intervals of not more than 12 feet on continuous runs of pipe shall be coated with a vapor barrier coating.
4. Breaks and punctures in the jacket material shall be patched by wrapping a strip of jacket material around the pipe and cementing, coating as specified for butt strips. The patch shall extend not less than 1½" past the break in both directions.
5. At penetrations such as thermometers, valve stems, etc., the voids in the insulation shall be filled with vapor barrier coating and the penetration sealed with a brush coat of the same coating.
6. PVC fitting jackets in concealed applications shall be with a strip of insulation jacket and brush coat of vapor barrier sealant.
7. PVC fitting jackets in exposed applications shall be neatly covered with a PVC/vinyl tape neatly smoothed.

O. Installation at Hangers and Anchors

1. Pipe insulation shall be continuous through pipe hangers.
2. Where pipe is supported by the insulation, galvanized sheet metal shields or saddles 12 inches long shall be provided. Shields/saddles shall be 20-gauge galvanized sheet metal for pipes 6" and smaller and 18 gauge for pipes 8" and larger.
3. Where shields are used on pipes 2 inches and larger, insulation inserts shall be provided at points of hangers and supports.
 - a. Insulation inserts shall be of calcium silicate, cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation.
 - b. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation.
 - c. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield.
 - d. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation.
 - e. Seal inserts into the insulation with vapor barrier coating.
4. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.

5. Insulate and vapor seal insulation at anchors same as piping for a distance not less than four times insulation thickness to prevent condensation.

3.2 PIPING INSULATION INSTALLATION

A. Fiberglass pipe insulation (FG)

1. Install insulation with longitudinal laps and butt strips additionally smoothly secured with Benjamin-Foster 85-20 adhesive.
2. Fittings and valves on pipe shall be similarly insulated with thickness equal to the adjacent pipe.

B. Flexible elastomeric pipe insulation (FU)

1. Miter 90 degree turns and elbows, tees, and valve insulation.
2. Secure longitudinal joints with vinyl tape on 9-inch centers.
3. Bond cuts, butt joints, ends, and longitudinal joints with adhesive. After adhesive cures, apply 2-inch wide pressure sensitive adhesive vinyl tape over bonded cuts, joints, and ends.

C. PVC pipe and fitting covers.

1. PVC pipe and fitting covers shall be installed with a smooth appearance and no visible wrinkles.
2. All longitudinal seams shall be installed such the joints facing up or to the back of the finished product.
3. All longitudinal and circumferential PVC jacket joints and connections shall be spot welded every 12" with Perma Weld Adhesive and subsequently neatly sealed with tight fitting pressure sensitive vinyl tape, installed without wrinkles.

D. Metal Jacket Installation

1. Metal jackets shall have side and end laps at least 2 inches wide with the cut edge of the side lap turned under one inch to provide a smooth edge.
2. Secure jackets in place with aluminum or stainless-steel bands on 9 inch centers.
3. Place laps to shed water.
4. Seal laps with weatherproof coating.
5. Where pipes penetrate exterior walls, continue the increased insulation thickness required for piping exposed to weather and the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.
6. In outside locations protect fittings, flanges, and valves with a weatherproof coating prior to installation of metal covers. Secure metal covers for fittings, flanges, and valves in place with metal bands and seal with a weatherproof coating.

3.3 PIPING INSULATION APPLICATIONS

PIPING INSULATION MATERIAL TYPE, SERVICE JACKET, VAPOR BARRIER AND THICKNESS TABLE									
SERVICE	INSULATION MATERIAL (NOTE 'A')	TYPE OF SERVICE JACKET REQ' D (NOTE 'B')	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)					NOTES
				½" – 1 ¼"	1 ½" – 3"	3 ½" – 6"	8" – 10"	11" – 36"	

DOMESTIC HOT AND RECIRCULATING	FG	B	YES	1	1.5	1.5	1.5	1.5	1,2,3,4,8,10,11
	FU	C	NO	1	1.5	1.5	1.5	1.5	
	P	B	NO	0.5	1	1	1	1	
DOMESTIC COLD WATER	FG	B	NO	0.5	1	1	1	1	1,2,3,4,8
	FU	C	NO	0.5	0.75	0.75	0.75	0.75	
A/C CONDENSATE DRAIN LOCATED INSIDE BUILDING	FG	A OR B	YES	1	1	1	1	1	4,5
	FU	C	NO	0.75	1	1	1	1	
DRINKING FOUNTAIN DRAIN PIPING (ON SEWER TIE-ON)	FG	B	YES	1	1	1	1	1	5
	FU	C	NO	1	1	-	-	-	
REFRIGERANT PIPING	FU	C	NO	SEE NOTES	SEE NOTES	-	-	-	6,8

NOTE 'A' – INSULATION MATERIAL				
MATERIAL	SPEC	TYPE	CLASS / GRADE	
FU	FLEXIBLE UNICELLULAR	ASTM C 534	-	-
FG	FIBER GLASS	ASTM C 547	1	1
P	PHENOLIC	ASTM C 552	-	-

NOTE 'B' – TYPE OF SERVICE JACKET REQUIRED	
A	FOIL BACKED ALL SERVICE JACKET (ASJ)
B	PAPER ASJ
C	NONE

TABLE NOTES:

- Flexible unicellular insulation shall be utilized on domestic piping concealed within interior and exterior walls and plumbing chases.
- Note that higher density insulation inserts shall be utilized on all water piping larger than 1-1/2" size, at all hanger/saddle supports, etc.
- Insulation located outside shall be one inch thicker than shown in table above.
- A full coverage PVC jacket shall be required on insulated piping and fittings exposed in mechanical rooms, in crawlspace, and in interior exposed applications everywhere. See Section *Mechanical Identification* for color requirements.
- Drain piping in concealed applications may be insulated with flexible unicellular or fiberglass.

6. Refrigerant piping shall be insulated as follows. Conventional heat pump or 2-pipe variable refrigerant systems shall have the larger pipe (hot gas line during heating operation) based upon the thickness corresponding to hot gas lines below and NOT the suction line thickness.
 - a. Suction lines - $\frac{3}{4}$ " thick for pipes less than 1" in size, 1" thick for pipes equal to or greater than 1" in size.
 - b. Liquid lines – 1" thick for pipes less than 1-1/2" in size, 1.5" thick for pipes equal to or greater than 1-1/2" in size.
 - c. Hot gas lines – 1.5" thick for pipes less than 1-1/2" in size, 2.0" thick for pipes equal to or greater than 1-1/2" in size.
7. Not used.
8. Provide metal jackets over insulation on all insulated piping exposed to outdoor weather (including refrigerant piping).

3.4 DUCTWORK INSULATION INSTALLATION

- A. Rectangular Ductwork Interior Acoustical Liner
 1. See Section *Ductwork*.
- B. External Duct Wrap Insulation
 1. Insulation shall be installed in a manner to prevent compression of the insulation.
 2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
 3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.
- C. Dual Wall Round and/or Oval Ductwork Insulation
 1. See Section *Ductwork*.

3.5 DUCTWORK INSULATION APPLICATIONS

DUCTWORK INSULATION MATERIAL TYPE, VAPOR BARRIER AND THICKNESS TABLE				
DUCTWORK FUNCTION/TYPE	INSULATION MATERIAL	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)	NOTES
Rectangular Low Pressure Supply Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Supply Air	DUCT WRAP	YES	2.2	2
Rectangular Low Pressure Return Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Return Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Exhaust Air	SEE NOTES	-	-	3
Round/Oval Low Pressure Exhaust Air	NONE	-	-	
Rectangular Low Pressure Outside Air	DUCT WRAP	YES	2.2	
Round/Oval Low Pressure Outside Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Heat Recovery Exhaust Air	SEE NOTES	-	-	1
Round/Oval Low Pressure Heat Recovery Exhaust Air	NONE	-	-	
Rectangular Low Pressure Transfer Air	SEE NOTES	-	-	1
Round/Oval Low Pressure Transfer Air	DUCT WRAP	YES	2.2	
Miscellaneous Ductwork and Accessories	DUCT WRAP	YES	2.2	4

TABLE NOTES:

1. See Section *Ductwork* for:
 - a. Additional acoustical internal insulation required in addition to specified external insulation. Omit external duct wrap insulation on indoor exposed ductwork.
 - b. Interior liner required on ductwork located outdoors.
2. See Section *Ductwork* for additional double wall sandwich insulation required in addition to specified external insulation.
3. See Section *Ductwork* for acoustical internal insulation required.
4. Miscellaneous Insulation and Acoustical Treatment Requirements:
 - a. Air Distribution Devices (Grilles, Registers and Diffusers):
 - i. The concealed frame and housing of all such devices above ceilings, in attics, walls, crawlspaces, etc., shall be factory insulated.
 - ii. When factory insulation is not available, duct wrap insulation shall be installed on any concealed frame, housings, plenums, etc.

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DIVISION 21
(Not Used)

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DIVISION 22
PLUMBING

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SECTION 220430 - PLUMBING SPECIALTIES**PART 1 – GENERAL****1.1 SCOPE**

- A. Domestic water, sewer, roof drainage and condensate drains, including piping, equipment and all necessary accessories as designated in this section.
- B. Furnish all cleanouts and/or test tees as shown on Contract Drawings and required by Code. Cleanouts shall be the same size as the pipe they serve, except that 4 inches shall be the largest size required. Cleanouts shall be provided at the foot of each soil stack and of each run, change in direction, and mains, not to exceed 50 feet apart inside of building and 80 feet apart outside of building. The smallest flush floor cleanout shall be 3" unless otherwise noted.

PART 2 – PRODUCTS**2.1 FLOOR DRAINS**

- A. Floor drains shall be in accordance with ANSI A112.21.1. Provide caulking flange for connection to cast iron pipe, screwed outlets for connection to steel pipe, and side outlet when shown. Provide suitable clamping device and extensions if required, where installed in connection with waterproofing membrane. (Submit detailed shop drawings of these drains). Double drainage pattern floor drains shall have integral seepage pan for embedding in floor construction, and weep holes to provide adequate drainage from pan to drain pipe.
- B. The following plumbing drains are Jay R. Smith Models, however equal Zurn, Wade, Jonespec, MIFAB, Watts or Josam models are acceptable. Note: Provide flashing clamp when required with waterproofing membrane.
 - 1. FD-1 – Floor Drain: (Toilet Areas) Zurn Model Z415-7B, duco coated cast iron body with nickel bronze 7" round strainer, clamping collar. Drain shall have trap primer connections where indicated. Size as indicated.

2.2 TRAPS

- A. Provide traps on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and setscrew escutcheons. Concealed traps may be wrought cast brass. Slip joints not permitted on sewer side of trap. Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture, or as scheduled.
- B. All drains, overflow, condensate and relief, to be routed to a trapped hub or floor drain. If plans are not specific, check with PROFESSIONAL over routing of such drains.

2.3 OTHER DRAINS

Other required drains, including condensate drain piping, relief and overflow drain piping shall be provided and installed by CONTRACTOR. See BASIC MECHANICAL MATERIALS AND METHODS for piping specifications. Drains with outlets outdoors shall include insect screen neatly attached over opening.

2.4 CLEANOUTS

- A. Cleanouts shall be as manufactured by Wade, Jay R. Smith, Zurn, Watts, or Josam, and shall be as follows:
1. Inside building, exposed on walls Zurn Model Z1446.
 2. Inside building where tile floors occur Zurn Model Z1400.
 3. Inside building where ceramic or quarry tile occurs Zurn Model Z1400.
 4. Outside building where concrete occurs Zurn Model Z1406.
 5. Outside building, no paving Zurn Model Z1449 with 18" x 18" x 4" concrete pad poured around cleanout with sloped top to shed water.
 6. I
- B. All interior cleanouts to have nicked bronze finish and exterior cleanouts a brass finish unless otherwise noted. All flush grade cleanouts and cleanouts in walks, etc., shall have inset square key stainless-steel covers.

PART 3 – EXECUTION

3.1 INSTALLATION: (DRAINS)

- A. Floor drains shall be installed according to manufacturer's recommendations. Provide and install all flashing and weatherproofing as required. Adjust extension sections on all drains as required for proper height adjustment.
- B. All floor drains connected to sanitary waste system to be trapped. Connect floor drains to sanitary waste piping as indicated on Contract Drawings.
- C. The CONTRACTOR shall connect to roof drains and exterior roof downspouts and route new piping to its conclusion outside of building as indicated on Contract Drawings.
- D. Each AC equipment drip and drain opening which normally or frequently discharges water (such as air conditioning unit drains, pump base and stuffing box drips, overflows, and similar drips and drains) shall be connected to the drain openings or piped down directly over the floor drains which are provided for the purpose, as applicable, whether indicated on the Drawings or not.
- E. Each water relief valve discharge shall be piped down to 6" above floor, but not necessarily over a floor drain or connected to a drain opening, unless otherwise indicated. No drain piping is required from the discharges of drain valves, unless otherwise indicated.
- F. The top of all floor and trench drain strainer covers shall be cleaned and polished prior to final inspection by the PROFESSIONAL.
- G. Drains shall be provided at all coils, receivers, pump suction lines, pump plates where facilities are provided and at all low points of the systems. Such drains shall consist of the necessary pipe, valves and fittings required in the opinion of the PROFESSIONAL to permit servicing of equipment, systems, etc.

3.2 INSTALLATION: (CLEANOUTS)

- A. Install cleanouts such that each type is flush with floor, walls, outside grade, etc.

Except as explicitly noted, all inside floor cleanouts shall be flush with finished floor surface.

- B. Flush grade cleanouts shall include a concrete pad surrounding cleanout as indicated above concrete pad and cleanout top shall be flush with finished grade.
- C. All cleanout plug threaded sections to be installed with appropriate lubricant and sealant for future maintenance and access.
- D. The top and faceplate of all cleanouts indoors shall be cleaned and polished prior to final inspection by the PROFESSIONAL.

END OF SECTION

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SECTION 220440 - PLUMBING FIXTURES, TRIM & ACCESSORIES**PART 1 – GENERAL****1.1 SCOPE**

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on plans.
- B. Work Included: Plumbing fixtures, associated trim and fittings necessary to make a complete installation from wall or floor connections to rough piping, and certain accessories.

PART 2 – PRODUCTS**2.1 FIXTURE TRIM**

- A. All exposed metal parts of all fixtures, including faucets, waste fittings, waste plugs, flush valves, traps, supplies, nipples, and escutcheons shall be chrome-plated brass unless other materials or finish is specified. Basket and similar strainer assemblies for sinks shall be stainless steel.
- B. Drain and waste assemblies below lavatories and sinks shall be minimum 17-gauge chrome plated brass and traps shall include cleanout plugs.
- C. Stops and supplies:
 - 1. All stops and supplies shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
 - 2. Chrome plated brass/copper supplies shall be provided on all water supplies to fixtures. All hot/cold faucet handles for lavatories, sinks and bath/shower supply fittings shall include red and blue color code indications.
 - 3. Stops shall be chrome-plated brass, angle all bronze compression quarter turn ball type as McQuire LFBV series. Locate stops centrally above or below fixture in accessible locations.

2.2 ESCUTCHEONS

- A. Provide chrome-plated escutcheons on all water and drain piping in wall, floor and ceiling penetrations.
- B. Heavy-duty type escutcheons, with setscrews shall be utilized in exposed applications under wall mounted lavatories and sinks and on exposed piping applications on tank type water closet stops and on exposed piping to flush valves, etc.
- C. Light duty slip-on type may be utilized in concealed installations within cabinets.

2.3 CARRIERS

- A. Provide appropriate carriers for all wall mounted water closets, urinals, lavatories, electric drinking fountains, and sinks, and as indicated elsewhere in these specifications or on the drawings, or as required. All carriers shall be concealed, floor mounted type unless otherwise approved by the PROFESSIONAL.
- B. Where wall hung water closets, urinals, lavatories, electric drinking fountains, or sinks are installed back to back and carriers are specified, provide one carrier to

serve both fixtures in lieu of individual carriers.

2.4 HANDICAPPED SERVICES

- A. Provide where required and/or indicated plumbing fixtures and installations that comply with the latest version of "American with Disabilities Act" (ADA).
- B. Provide neat pre-packaged molded insulation protection on an exposed drain and water piping below sinks and lavatories equal to TRUEBO Models #102 and #105.

2.5 PLUMBING FIXTURES AND TRIM

Furnish and install all plumbing fixtures specified herein and shown on plans. Kohler fixtures are specified, however, Eljer, or American Standard may be used if they are equal in all respects to those specified. CONTRACTOR shall submit data on trim as well as fixtures.

All water closets, urinals and other fixtures associated with flush valves shall be water conservation type unless specified otherwise. All lavatory and shower supply fittings shall be of the flow restrictor type, unless specified otherwise. Flush valves shall be Zurn type "AV" or Sloan Royal with clog resistant design.

- A. Water Closets: All water closet seats shall have stainless steel mounting post and fasteners with "Sta-Tite" technology as Bemis or Church.
 1. WC-1 – ADA Compliant floor mounted vitreous china siphon jet with elongated bowl and 1-1/2" top spud, 2" passage and 1.6-gallon flush. (Coordinate with grab bar and ARCHITECT's details per ADA requirements. Install with handle opposite nearest corner installation).
 - a. Fixture: Kohler Model K96057 (Highcliff Ultra).
 - b. Flush valve: Sloan Royal Model 111 SFMS-1.6 battery powered sensor operated with mechanical manual override button.
 - c. Seat: Bemis Model 10SSCT.
 2. WC-2 Floor mounted vitreous china siphon jet with elongated bowl and 1-1/2" top spud, 2" passage and 1.6-gallon flush.
 - a. Fixture: Kohler Model K96053 (Welcomme Ultra).
 - b. Flush valve: Sloan Royal Model 111 SFMS-1.6 battery powered sensor operated with mechanical manual override button.
 - c. Seat: Bemis Model 10SSCT.
 3. WCV-1 – Replacement flush valve. Reuse existing fixture in place, clean thoroughly and replace seat.
 - a. Flush valve: Sloan Royal Model 111 SFMS-1.6 battery powered sensor operated with mechanical manual override button.
 - b. Seat: Bemis Model 10SSCT.
- B. Urinals:
 1. U-1 – ADA Compliant wall mounted vitreous china washout design with 3/4" top spud, 2" outlet and high efficiency 1.0-gallon flush.
 - a. Fixture: Kohler Model K 4904-ET-0 (Bardon).
 - b. Flush valve: Sloan Royal Model 186 SFMS-1.0 battery powered sensor operated with mechanical manual override button.
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.

2. U-2 – Wall mounted vitreous china washout design with 3/4” top spud, 2” outlet and high efficiency 1.0-gallon flush.
 - a. Fixture: Kohler Model K 4904-ET-0 (Bardon).
 - b. Flush valve: Sloan Royal Model 186 SF5M-1.0 battery powered sensor operated with mechanical manual override button.
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.
- C. Lavatories:
1. L-1 – ADA Compliant wall mounted vitreous china with single hole drilling and 5” backsplash.
 - a. Fixture: Kohler Model K 2007 (Kingston).
 - b. Faucet: Sloan Model SF-2450 battery powered sensor operated, 0.5 gpm vandal resistant aerator.
 - c. Carrier: Zurn adjustable floor mounted wall carrier(s) as required.
 2. LF-1 – Replacement faucet and trim. Reuse existing fixture in place and clean thoroughly..
 - a. Faucet: Sloan Model SF-2450 battery powered sensor operated, 0.5 gpm vandal resistant aerator.
 - b. Accessories and Trim:
 - i. Offset tailpiece and drain as specified herein
 - ii. Provide stainless steel caps on all non-utilized hole drillings in existing lavatory.
- D. Service Sinks:
1. SS-1 – Terrazzo, drop front, floor mounted, corner mop sink (size 24”x24”x12”).
 - a. Fixture: Acorn Model TNC-24.
 - b. Faucet: T&S Brass Model B-0665-BSTR mop sink faucet with vacuum breaker, wall brace and pail hook.
 - c. Accessories and Trim:
 - i. 20 ga. stainless steel cap on drop front
 - ii. 12” high stainless-steel back panels on all walls.
 - iii. Acorn Model KMH mop hanger (mounted above sink).
- F. Drinking Fountains/Bottle Fillers: All capacities (G. P. H.) are based on 50-degree F., drinking water, 80-degree F., inlet water and 90-degree F. ambient. All shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
1. EDF-1 – ADA Compliant, dual height, barrier-free, one-piece stainless-steel basin with integral drain and push button and stainless-steel cabinet. 8.0 gallons per hour.
 - a. Fixture: Murdock Model A172408F-UBL.
 - b. Accessories and Trim:
 - i. BF12 – Sensor operated water stainless steel bottle filling station
 - ii. WF1 – Water Filter, NSF 42 and 53, 1500-gallon capacity, 1 micron.
 - iii. Cane touch apron for installation on exposed wall

- applications
- c. Carrier: Wade adjustable floor mounted wall carrier(s) as required.
- 2. EDF-2 – ADA Compliant wall mounted barrier-free, one-piece stainless-steel basin with integral drain and push button and stainless-steel cabinet. 8.0 gallons per hour.
 - a. Murdock Model A171408F.
 - b. Accessories and Trim:
 - i. BF12 – Sensor operated water stainless steel bottle filling station
 - ii. WF1 – Water Filter, NSF 42 and 53, 1500-gallon capacity, 1 micron.
 - iii. Cane touch apron for installation on exposed wall applications
 - c. Carrier: Wade adjustable floor mounted wall carrier(s) as required.
 - 3. EDF-3 – Wall mounted barrier-free, one-piece stainless-steel basin with integral drain and push button and stainless-steel cabinet. 8.0 gallons per hour.
 - a. Murdock Model A171408F.
 - b. Accessories and Trim:
 - i. BF12 – Sensor operated water stainless steel bottle filling station
 - ii. WF1 – Water Filter, NSF 42 and 53, 1500-gallon capacity, 1 micron.
 - iii. Cane touch apron for installation on exposed wall applications
 - c. Carrier: Wade adjustable floor mounted wall carrier(s) as required.
- G. Hose Bibbs:
- 1. HB-1 - Hose Bibb: Non-freeze wall hydrant (designed to fit one standard modular masonry course), stainless steel box with hinged locking cover stamped "WATER", bronze hydrant, hose connection with integral vacuum breaker, and "T" handle key, Wade Model 8701-BB, Hydrant shall be 3/4 inch.
- H. Trap Primers:
- 1. TP-1 Trap Primer: Trap primer shall be connected to water closet flush valve. Exposed piping shall be chrome plated, provide chrome-plated escutcheon at mount to wall. Zurn Model Z-6000 TPO.
- I. Trap Guard
- 1. TG-1 - Trap Guard: Flexible elastomeric tube treated to roll up when water is not passing through to resist emission of sewer gases, as ProSet®, MiFab, Smith, or Green Drain. Trap guard to be designed to meet dimensional and installation requirements of specified floor drain.

J. Water Hammer Arrestors (WHA):

1. Water hammer arrestors shall be piston type.
2. Water hammer arrestors shall be type approved for installation with no access panel required.
3. All water hammer arrestors shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
4. The following schedule for Sioux Chief Hyrda-Rester arrestors shall apply:

P.D.I SYMBOL	FIXTURE UNIT RATINGS
A	4-11
B	12-32
C	33-60
D	61-113
E	114-154
F	155-330

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Fixture Setting: Opening between fixture and floor and wall finish shall be sealed with silicone based caulking. Grout other excessive gaps as required.
- B. Supports and Fastenings: Secure all fixtures, equipment and trimmings to partitions, walls, etc., with brass through bolts, toggle bolts, expansion bolts, or power set fasteners, as required. Exposed heads of bolts and nuts in finished rooms to be hexagonal, polished chromium plated brass with rounded tops.
- C. Support wall hung lavatories and urinals by appropriate carriers.
- D. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury.
- E. Attach floor mounted water closets to closet flange.
- F. Items supplied by others as denoted are to be furnished complete with stops, risers, faucets, strainers, tailpiece, and traps. The intent is that this CONTRACTOR shall provide all "rough in" through face of wall and shall connect equipment provided by others, except where otherwise noted.
- G. All exposed metal trim and piping shall be chrome plated brass and polished.
- H. Trim which can be removed or disassembled without tools is not permitted.
- I. Furnish and install plumbing fixtures and pertaining appurtenances of the manufacturer and model number as indicated in these specifications and/or noted on the plans.
- J. Replace any fixtures or equipment broken, cracked, discolored, pitted, or otherwise imperfect.
- K. Setting height or location of fixtures shall be as dimensioned or as directed by ARCHITECT.

- L. Provide plumbing fixtures with accessible stops in supplies or with integral stops in faucets. Provide lavatory faucets, sink faucets, and supply stops with renewable seats.
- M. Provide closets with white bolt caps with retainer clips. Use all mineral gasket with plastic discharge sleeve having ethane core reinforcement.
- N. Install all wall, roof and ground hydrants in strict accordance with manufacturer's recommendations and applicable details on Drawings. Hydrants shall be installed such that box/hydrant is square and plumb with adjacent building construction. Where wall hydrants are specified to match standard brick dimensions, adjust location in field to avoid cutting bricks and install with long dimension horizontal and hinge on bottom of box.
- O. Install all fixtures in strict accordance with manufacturer's recommendations.
- P. Water Hammer Arrestors:
 - 1. All water supply piping fittings and fixtures shall be protected against water hammer, shock or surge pressure by installation water hammer arrestors.
 - 2. Water hammer arresters shall be installed per the manufacturer's recommendations. This shall include spacing, sizing, etc.
 - 3. Fixture piping shall be adequately anchored to prevent vibration.
 - 4. CONTRACTOR must guarantee against water hammer at end of project.

3.2 CLEANING:

At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

3.3 OPERATIONAL TESTS

Pour at least five (5) gallons of water into every floor drain to test for pipe stoppage. Remedy all stoppage.

END OF SECTION

SECTION 220450 - DOMESTIC WATER HEATERS AND ACCESSORIES**PART 1 – GENERAL****1.1 SCOPE**

Provide all labor, equipment, material, etc., required to complete water heater installations specified herein and/or shown or scheduled on Contract Drawings.

1.2 APPLICABLE STANDARDS

- A. A.S.M.E. Code Sections where referenced or applicable.
- B. The water heater shall include all standard equipment as shown on manufacturer's specification sheet, shall fit properly into the space provided for it and shall conform to the Drawing requirements. The complete installation shall be in accordance with all applicable state and local codes and installation drawings/details.

PART 2 – PRODUCTS**2.1 DOMESTIC HOT WATER EQUIPMENT****A. Small Electric Storage Type Water Heaters:**

- 1. Heater shall be of the electric type. Heater shall have a glass lined welded steel tank, tested for 150 psi working pressure. Tank shall be insulated with blanket type fiberglass and assembly shall be enclosed in jacket with baked on enamel finish and mounted on sturdy legs. Heater shall be complete with an ASME temperature and pressure relief valve and gauges, immersion type copper sheathed heating element, anode rod, automatic thermostat, and hi-limit magnetic contactors.
- 2. Provide manufacturer's wall mounting bracket on units shown to be installed same.
- 3. Unit shall be of the size and capacity indicated on Contract Drawings.

2.2 ACCESSORIES**A. Water Tempering and/or Mixing Valves:**

All valves shall be furnished with integral check stops and a dial thermometer with the temperature range, of indicated extents, on the outlet of the valve assembly.

1. MV-1 (Point of Use Mixing Valve):

Thermostatic tempering valve shall be constructed of solid brass. All internal components shall be corrosion-resistant. Valve shall feature integral checks to prevent cross-flow and inlet screens to filter out debris. The valve shall be CSA B125 certified and ASSE 1017 listed. Valve shall perform to a minimum flow of 0.5 gpm to ASSE 1017-2003. Control temperature shall be adjustable between 60° F - 120° F. The valve shall feature a vandal-resistant lockable handle to prevent tampering. The valve shall be equal to Powers HydroGuard LFLM490 Series.

- B. Relief Valve for Gas and Electric Water Heaters: Brass or bronze, fully automatic, self-closing combination pressure and temperature ASME relief valve. Pressure relief valve shall be spring operated with testing lever, set for 100 pounds pressure.

Temperature relief valves shall contain a non-corrosive metal thermostat with bulb. Pipe discharge to floor or as directed on Drawings or by PROFESSIONAL.

C. Potable Water Expansion Tank (EXPT)

Provide potable water expansion tanks with factory finished metal outer jacket with FDA approved rubberized bladder with pre-charged tank and charging valve. Acceptance volume shall be within five percent (5%) of minimum specified (see detail(s) on schedule on Drawings). Support units as recommended by unit manufacturer and Industry Standards. Expansion tanks shall be rated for 125 psi. ASME construction shall be provided where water heater is ASME constructed. See Schedule/Drawings for more information.

PART 3 – EXECUTION

3.1 LEAKAGE TEST:

Before connections are made, test heaters and tanks with hydrostatic pressure of 150 psig and prove tight.

3.2 PERFORMANCE TEST:

- A. Prove system is balanced and 105 degrees F. is available at farthest outlet from heaters.
- B. Install heater as per manufacturer's instructions. Refer to Section *Basic Mechanical Materials and Methods* for instruction of ferrous to non-ferrous piping connections. Refer to Drawings for detail of water heater installation, if applicable.
- C. Provide all pipe, fittings, and accessories as indicated or required for complete installation.

END OF SECTION

DIVISION 23
HEATING VENTILATING
AND AIR CONDITIONING

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SECTION 230670 - PACKAGED AIR CONDITIONERS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Self-contained units, rooftop units, window units, through-wall units, computer room units, and split systems.
- C. Warm air furnace/evaporator coil and condensing units.
- D. Definitions:
 - 1. Energy Efficiency Ratio (EER): A ratio calculated by dividing the cooling capacity in Btuh by the power input in watts at any given set of rating conditions, expressed in Btuh per watt (Btuh/watt).
 - 2. Unitary (ARI): Consists of one or more factory-made assemblies, which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function.

1.2 APPLICABLE STANDARDS

- A. Refer to Section *Basic Mechanical Materials and Methods*.
- B. Safety Standards:
 - 1. Design, manufacture and installation of mechanical refrigeration equipment: ANSI B9.1.
 - 2. Machinery Guards: Provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated unit casings.
- C. Corrosion Prevention: Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc-coating conforming to ASTM A386 or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall be tested for 500 hours. The salt-spray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment, shall be not less than film thickness used on the test specimen.
- D. ARI Standards:
 - 1. Capacity 135,000 BTU/HR and Greater: ARI 360.
 - 2. Capacity Below 135,000 BTU/HR: ARI 210. Units shall be listed in the ARI Directory of Certified Unitary Air Conditioners.

PART 2 – PRODUCTS

2.1 UNITARY AIR CONDITIONERS

Self-Contained Combination Packaged Unit (Up to 25 Tons): Air-conditioner shall be a factory packaged cooling combination heating and cooling single zone unit as indicated and shall be suitable for mounting on either the roof of building or a concrete pad on ground as indicated on Drawings. The package shall consist of one or more refrigerant compressors with electric motors, cooling coils, condensers, fans, air filters, heating section, control wiring and piping, all factory assembled in a weatherproof enclosure mounted on a structural steel base ready for field connection to utilities and ducts. The package unit shall be sufficiently rigid and arranged to permit handling by a crane boom or by helicopter.

- A. Unit Enclosure: Construct with removable insulated access panels completely weatherized for outside installation, and properly reinforced and braced. Provide panels and access door for inspection and access to all internal parts. Provide insulated enclosure with adequate reinforced points of supports for setting of the unit. Joints shall be air and watertight. Base shall consist of a one piece welded assembly with 14 gauge members.
- B. Access to compressors, evaporator fan, controls and air filter sections shall include hinged access doors with weatherproof gasketed seal and quarter turn latches.
- C. See Detail on Drawings for curb construction requirements.
- D. Provide manufacturer approved heavy duty louvered or expanded metal grille hail guard spaced minimum 2" from face of condensing coil. See detail on Contract Drawings.
- E. Cabinet Insulation: One inch (1") thick and 3/4 pound density to prevent condensate from forming on the unit casing from air entrance at coils to air outlet of unit. Insulation shall meet the requirements of NFPA Standard 90A and be protected against deterioration and delamination from air currents. Insulate condensate drain pan with water impervious insulation of sufficient thickness to prevent condensate formation on the exterior at ambient conditions encountered.
- F. Evaporator Fan: Forward curved type (or backward inclined) DWDI Class I centrifugal type specifically designed and suitable for the operating pressure conforming to AMCA 210. Provide adjustable pitch pulley. Units shall have greaseable lubricated ball bearings. Statically balance fan assemblies in the fan housing and final assembly. Fan motors to be isolated with spring isolators. Fan motors shall conform to NEMA MG-1. Motor starters shall conform to NEMA ICS. Motors shall have thermal overload protection. Three phase motors shall have protection from phase loss, reversal, and high/low voltage.
- G. Compressors: Provide scroll type conforming to ARI 520, provided with all minimum standard equipment and accessories listed therein.
 - 1. Compressor shall be of the scroll type and shall include high and low pressure cutouts, overloads, and inherent thermostat.
 - 2. Compressors shall be suction gas cooled and include integral centrifugal oil pump to provide positive lubrication of all moving parts.
 - 3. Compressors shall include anti-slugging device, timed automatic restart

delay and crankcase heaters.

4. Individual compressor isolation valves shall be provided where compressors are installed in tandem arrangement on the same refrigerant circuit.
5. Three phase compressors shall have protection from phase loss, reversal, and high/low voltage.

H. Coils:

1. Condenser, and evaporator coils shall be copper type with aluminum fins and conform to ARI 410 or as approved.
2. Condensing Coils for Multi-Compressors: Provide a separate air cooled condenser circuit for each multi-compressor separate circuited installation(s). If compressors are paralleled, provide not less than two independent circuits, and no less separate circuits or distinct levels of control than scheduled. A common-housing may be used, but each coil must be provided with separate controls to operate individual condenser fans for each coil. All coils shall sub-cooler. The air-cooled condenser coil shall be extended-surface fin-and-tube with seamless copper tubes with aluminum fins. The coils shall be tested for 425 psi. In the event one compressor fails, the other compressor(s) shall continue to operate on the other independent circuit.
3. Evaporator coils for multi-circuited systems shall be split face design.

I. Filter Boxes: Provide filter boxes with insulated hinged access doors with snug fitting air filter frame allowing a maximum 1% of scheduled air flow bypass.

Filters shall be of the high velocity to serve the airflow capacity indicated on Contract Drawings. See Section *Air Cleaning/Treatment* for air filter specifications, including type, efficiency and number.

J. Heating Section (All units shall have heat in reheat position):

1. Primary heating/reheat capability (dehumidification mode).
Hot refrigerant gas condenser coil (when refrigerant compressor(s) are running) with two-position hot gas reheat valve.
2. Secondary/Supplemental Heating (in Reheat Position)
Gas Fired Furnace: Heat exchanger tubes and cylindrical drum shall be constructed of aluminized steel with a stainless steel power burner section. Stainless steel power burner shall have prepurge, electric spark ignition, 100% safety shutoff controls, electronic flame sensing controls, series gas valves and limit controls. Staging control shall be with separate gas valves. All controls shall be listed for operation at low outdoor air temperatures. Burner shall be equipped with inspection window and air shutter for combustion air adjustment. Complete service access shall be provided for controls and wiring. Shall be A.G.A. design certified for outdoor installation. Units with cooling capacity exceeding 5 tons shall have 2-stage heating capability heat in the re-heat position. Provide multistage controls of capacity and characteristics as scheduled on Drawings.

- K. Power Safety and Auxiliary Electric Controls and Accessories:
1. Three-phase units shall be provided with phase loss/reversal and brownout protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage, or the voltage is more than 10% under or over design voltage. These electrical controls shall include automatic restart capability.
 2. Unit shall be provided with a factory installed 115 volt, 15 amp ground fault service receptacle. Receptacle to be factory powered.
 3. Rooftop mounted equipment shall be provided with thru-base electrical connections.
- L. Controls:
1. Unit shall be factory provided with a BACNET MSTP interface "card" to allow Owner's building EMS to read, reset, and control unit operation from remote workstation, etc.
 2. Combination automatic heating/cooling changeover and auto-on fan switch shall be remotely zone mounted where indicated. Mount all other controls including motor starters and safety controls inside the enclosure. All wiring inside enclosure shall be accomplished at the factory. Unit mounted control panel shall include magnetic contactors for compressor, evaporator and condenser fan motors, three leg compressor overloads high and low pressure cutouts, oil pressure cutouts, non-recycling pump down and reset relay.
 3. Condenser Controls: Provide head pressure control with variable speed condenser fans to insure condensing temperature for proper system operation at all ambient temperatures down to 0°F. Condenser fans to be heavy duty permanently lubricated ball bearing type with built-in thermal overload protection. Provide units with low ambient controls where scheduled with multiple cooling circuits or required to provide stable operation to suit application.
 4. Condenser Start Up Control: Provide condenser with a start-up control package which permits start-up of compressor at ambient temperature of 0°F. Package shall temporarily by-pass system low pressure-start to permit start-up whenever minimum ambient temperature is below design evaporator coil suction temperature. Provide low ambient start-up capability where required to suit application.
 5. Economizer:
 - a. Systems scheduled on Drawings shall have an outdoor air option with moisture eliminators and full economizer cycle and shall include motorized automatic exhaust fan or fans, and motorized automatic modulating return and outside air dampers. Economizer cycle shall be controlled on a differential enthalpy basis.
 6. Provide low limit temperature sensors on face of evaporator on systems with multiple refrigeration circuits for each stage of refrigeration, with adjustable time delay and automatic restart controls.

- M. Warranty: See Section *Mechanical Systems and Equipment Warranties* for more information.

2.2 SPLIT DIRECT EXPANSION SYSTEMS

A. Warm Air Furnace and Evaporator

1. Natural Gas Furnaces:

- a. Furnaces shall be of the natural gas fired, up flow or horizontal type as indicated, complete with filters centrifugal blower and motor, burners, heat exchangers, controls, and cabinet.
- b. Filters shall be of the high velocity replaceable pleated type to serve the airflow capacity indicated on Contract Drawings. The filter rack assembly shall be easily accessible, and shall include clips, spring and/or other suitable means to hold air filter secure. Filter rack shall also include a track or other suitable framework such that filter is set in place without adjustment to ensure no more than 5% air bypass around air filter assembly. Filters shall be in accordance with Section *Air Cleaning/Treatment*.
- c. Blower shall have forward curved blades, statically and dynamically balanced. Motor shall be of the three speed permanent split capacitor direct driven type, for 5 ton units and smaller, complete with built-in overload protection.
- d. Controls shall consist of blower fan delay relay, manual shut-off gas electronic valve, electronic pilot ignition, transformer (120-24 volt), combination fan and limit switch control blower fan delay relay, and room thermostat with heating and cooling switch, one or two stage as indicated.
- e. Furnace cabinet shall be thermally and acoustically insulated with fiberglass coated to prevent erosion.
- f. Furnaces shall be AGA approved and shall have capacities and characteristics indicated on Contract Drawings. All units shall be rated 90% A.F.U.E. or better.
- g. Warranty: See Section *Mechanical Systems and Equipment Warranties* for more information.

2. Evaporator Coil: (Matched to Gas Furnace)

- a. Coil shall be sized to fit above warm air furnace. Coil shall have copper tubes and aluminum fins. An insulated casing shall be provided around coil.
- b. Capacity and characteristics shall be as indicated on Contract Drawings. Provide data on air pressure drop of evaporator.
- c. Evaporator coil shall be constructed of aluminum fins, mechanically bonded to copper tubes. Coil shall be tested for 300 psi. Coil shall be dual circuited on units larger than 5 tons.
- d. Warranty: See Section *Mechanical Systems and Equipment*

Warranties for more information.

- e. Provide evaporator face mounted low temperature sensor and adjustable compressor timed delay/auto-restart controls where low ambient controls for condensing units are indicated.
3. Heat Pump Heating and Cooling Blower Package: (Vertical or Horizontal Unit, as indicated).
- a. Unit shall consist of reverse-cycle heating section and cooling coil in preassembled package. Unit shall consist of a supply fan, evaporator/heat pump coil and air filter section assembled in common cabinet.
 - b. Casing shall be heavy gauge steel, phosphatized and finished with baked-on enamel. Evaporator and heat exchanger sections shall be insulated with one-inch (1") thick foil-faced glass fiber.
 - c. Evaporator coil shall be constructed of aluminum fins, mechanically bonded to copper tubes. Coil shall be tested for 300 psi. Coil shall be dual circuited on units larger than 6 tons, or as scheduled.
 - d. Electric resistance open wire nichrome heaters factory designed for compatibility with the air-handling unit.
 - e. Supply fan shall be belt driven, forward curve, centrifugal type for unit over 5 tons; and smaller units shall be direct driven, three-speed permanent split capacitor type. Fan and motor shall have permanently lubricated ball bearings. Motor sheave on belt driven models shall be adjustable. Motor shall have inherent overload protection.
 - f. Filters shall be of the high velocity replaceable pleated type to serve the airflow capacity indicated on Contract Drawings. The filter rack assembly shall be easily accessible, and shall include clips, spring and/or other suitable means to hold air filter secure. Filter rack shall also include a track or other suitable framework such that filter is set in place without adjustment to ensure no more than 5% air bypass around air filter assembly. Filters shall be in accordance with *Section Air Cleaning/Treatment*.
 - g. Provide units with single point power connection and control box with circuit breakers for overload and short circuit protection. Factory wired and mounted on electric heat unit. Circuit breakers shall qualify as disconnect means at unit. Provide unit with circuit breaker cover kit to protect circuit breaker.
 - h. Capacity and characteristics shall be as scheduled on Contract Drawings.
 - i. Warranty: See *Section Mechanical Systems and Equipment Warranties* for more information.
- B. Condensing Unit: (Up to 20 Tons):
1. Units shall be single or dual circuit type, as scheduled, and shall consist of

- scroll compressor(s) and, condenser coil(s), condenser fans, refrigerant receiver, charging valves, controls and holding charge, all enclosed in weatherproofed zinc-coated steel casing, phosphatized and coated in epoxy resin primer and finished with baked-on enamel.
2. Condenser Hail Coil Guards: Provide manufacturer approved heavy-duty louvered or approved expanded metal, factory primed and painted to match unit enclosure and mounted in a rigid frame with a minimum of 2" clearance to coils. See detail on Contract Drawings.
 3. Compressor shall be of the scroll type and shall include high and low pressure cutouts, overloads, and inherent thermostat. Compressors shall include anti-slugging device, timed automatic restart delay and crankcase heaters.
 4. Condenser coils shall be constructed of copper tubes and aluminum fins, tested for 425 psi.
 5. Condenser fans shall be of the propeller type, statically and dynamically balanced, weatherproofed, and powered by heavy-duty permanently lubricated ball bearing motor with built-in thermal overload protection.
 6. Controls shall include contactors, high-pressure outlet with thermostatic reset, low-pressure cutout and reset relay to prevent unit cycling on overloads when once the automatic resetting safety control trips. Where indicated or scheduled, provide units with low ambient controls with stable operation down to 0 degrees F including variable feed refrigerant head pressure controlled condenser fan operation. All wiring and devices shall be internal to cabinet. Exposed wiring is not acceptable.
 7. Refer to Section *Pipes and Pipe Fittings* for refrigerant piping specifics. CONTRACTOR shall note that any piping, joint, fitting, etc. that comes in contact with the refrigerant system shall be brazed. Compression fittings are not acceptable.
 8. Capacities and characteristics shall be as indicated on Contract Drawings.
 9. Three-phase compressors shall be protected from over and under voltage and phase loss with automatic restart capability.
 10. (Heat Pump Units) Defrost Control: An outdoor coil defrost control system shall be incorporated into the base unit to prevent frost accumulation during the heating cycle. Defrost shall be initiated on the basis of time and coil temperature. A 90 minute timer will activate defrost only if coil temperature is low enough to indicate a heavy frost condition. Defrost cycle shall terminate when defrost thermostat is satisfied and shall have a positive termination time of 10 minutes.
 - a. On split systems with multiple refrigerant circuits, defrost controls will prevent simultaneous defrosting of individual circuits.
 - b. An outdoor thermostat will restrict electric resistance heating above 40°F.
 11. Warranty: See Section *Mechanical Systems and Equipment Warranties* for

more information.

C. Ductless Mini-Split Systems:

1. Unit shall consist of reverse-cycle heating section and cooling coil in preassembled package. Unit shall consist of a supply fan, evaporator/heat pump coil and air filter section assembled in common cabinet.
2. Compressor shall be inverter driven variable speed type. Provide with refrigerant isolation valves on unit.
3. Unit shall include automatic restart capability following power outage.
4. Capacity and characteristics shall be as indicated on Contract Drawings. Provide data on air pressure drop of evaporator.

2.3 REFRIGERANT SPECIALTIES

- A. Refrigerant specialties shall be provided and include thermostatic type expansion valves, refrigerant strainers, liquid sight-flow fittings, moisture indicator, and other devices indicated by the drawings and diagrams. Thermostatic expansion valves shall have externally mounted thermostatic elements connected to valve through capillary tubing of suitable length with external equalizer and with super heat adjustment.
- B. Solenoid valves shall be suitable for a minimum of 250 lbs. working pressure fitted solder type or threaded connections and with seal-cap type manual lifting stem. Valves shall be suitable for operation with available current and provided with suitable solenoid coil protector. Specialties shall be Alco or Sporlan.
- C. Provide ahead of each expansion valve a sight glass. Provide ahead of each expansion valve and/or solenoid valve a filter-dryer and moisture indicator.

PART 3 – EXECUTION

3.1 INSTALLATION

Handle and install units and accessories in accordance with ARI 260 and the manufacturer's printed instructions. Unit shall be started up and checked out by a factory service representative. CONTRACTOR shall furnish PROFESSIONAL completed start-up report covering unit operation and start-up. A copy of same shall be included in Close-out Documents. See Section MECHANICAL CLOSE-OUT REQUIREMENTS.

3.2 TESTS

Perform tests and make reports in accordance with Sections *Basic Mechanical Materials and Methods* and *Testing, Adjusting, and Balancing*.

3.3 UNIT CAPACITY

Characteristics and capacity of systems shall be as indicated on Contract Drawings.

3.4 CONTROLS

All systems will be provided with automatic heating/cooling changeover controls; one or two stage heating and/or cooling as required. Provide auxiliary time clocks and thermostats and/or humidistats as indicated in Section *Controls and Instrumentation*.

3.5 AIR FILTRATION

See Section *Air Cleaning/Treatment* for specific requirements.

END OF SECTION

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SECTION 230756 - PACKAGED HEAT RECOVERY EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Self-contained units, rooftop units and split systems involving heat and/or energy recovery HVAC applications and equipment for space temperature and humidity control in accordance with ASHRAE 62 2001 and latest editions and addenda.
- C. Definitions:
 - 1. Energy Efficiency Ratio (EER): A ratio calculated by dividing the cooling capacity in Btuh by the power input in watts at any given set of rating conditions, expressed in Btuh per watt (Btuh/watt).
 - 2. Unitary (ARI): Consists of one or more factory made assemblies which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function.

1.2 APPLICABLE STANDARDS

- A. Refer to Section *Basic Mechanical Materials and Methods*.
- B. Safety Standards:
 - 1. Design, manufacture and installation of mechanical refrigeration equipment: ANSI B9.1.
 - 2. Machinery Guards: Provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated unit casings.
- C. Corrosion Prevention: Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc coating conforming to ASTM A386 or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salt spray fog test, except that equipment located outdoors shall be tested for 500 hours. The salt spray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution.
- D. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment shall be not less than film thickness used on the test specimen.
- E. Applicable ARI Standards:
 - 1. Capacity 135,000 BTU/HR and Greater: ARI 360.
 - 2. Capacity Below 135,000 BTU/HR: ARI 210. Units shall be listed in the ARI Directory of Certified Unitary Air Conditioners.

F. Electrical:

All motors shall be of premium/high efficiency type, with starters/controllers in conformance with Section *Electrical Requirements*.

G. Fans:

1. Fans shall be listed in the current edition of AMCA 261, and shall bear the AMCA performance seal.
2. Operating Limits for Centrifugal Fans: AMCA 99 (Class I, II, and III).
3. Fans shall comply with the following standards:
 - a. Testing and Rating: AMCA 210.
 - b. Sound Rating: AMCA 300.
4. Performance Criteria:
 - a. The schedule shows CFM and design external static pressure. Scheduled fan motors, ½ horsepower and larger, are to be sized for design CFM at 110 percent design static pressure, but not to exceed ¾-inch additional pressure.
 - b. Provide fans and motors capable of stable operation at design conditions and at 110 percent pressure as stated above.
 - c. Lower than design pressure drop of approved individual components may allow use of a smaller fan motor and still provide the safety factor. When submitted as a deviation, a smaller motor may be approved in the interest of energy conservation.
 - d. Select fan operating point as follows:
 - i. Forward curved and axial fans: Right hand side of peak pressure point on applications less than 1-1/2" total static pressure.
 - ii. Airfoil, backward inclined or tubular: Near the peak of static efficiency on applications exceeding 1-1/2" total static pressure.
 - iii. Safety Criteria: Provide manufacturer's standard screen on fan inlet and discharge exposed to operating and maintenance personnel.

PART 2 – PRODUCTS

2.1 UNITARY AIR CONDITIONERS WITH INTEGRAL ENERGY RECOVERY CAPABILITY (HRU)

Rooftop or Self-Contained Combination Packaged Unit: Air conditioner shall be a factory packaged combination heating and cooling unit as indicated and shall be suitable for mounting on roof of building or concrete pad on ground. The package shall consist of one or more refrigerant compressors with electric motors, cooling coils, condensers, fans, filters, heating section, control wiring and piping, all factory assembled in a single weatherproof enclosure mounted on a structural steel base ready for field connection to

utilities and ducts. The package unit shall be sufficiently rigid and arranged to permit handling by a crane boom or by helicopter. Provide the unit with remote control panel, roof curbs and flashing, transition plenums and controls as listed here in. Unit shall be provided completely factory assembled, pre-piped, wired and shipped. In one piece, except that a modular unit configuration may be utilized and shipped for field assembly to yield a one-piece arrangement. But in all cases, the manufacturer shall have complete and comprehensive warranty, and functional/capacity responsibility to the OWNER, including controls. The manufacturer shall provide all necessary technical assistance to the CONTRACTOR and OWNER, towards the proper handling, installation, start-up, servicing, maintenance and operation of the entire system. In essence, this system requires one source responsibility and an extended full-service manufacturer's warranty, excluding filter maintenance.

A. Unit Enclosure:

1. The cabinet shall be constructed of G90 weight galvanized metal, with minimum 18-gauge exterior panels, and minimum 22-gauge interior panels for a double wall design. Construct with removable access panels completely weatherized for outside installation, and properly reinforced and braced. Provide panels and access door for inspection and access to all internal parts. Provide enclosure with adequate reinforced points of supports for setting of the unit. Joints shall be air and watertight. Base shall consist of a one-piece welded assembly with 14-gauge members.
2. Furnish and install a steel roof-mounting frame for bottom discharge and return (or horizontal supply and return) air connection, as indicated on Plans. It shall mate to the bottom perimeter of the equipment. When flashed into the roof it shall make a unit mounting curb and provide weatherproof duct connection and entry into the conditioned area. Frame shall be approved by National Roofing Contractors Association. Roof curb shall be minimum 14" high and shall be constructed of minimum 14-gauge galvanized steel. Curb shall provide weather tight installation. Inside of curb and top of roof shall be lined with sound attenuating material furnished by manufacturer. Provide curb of type to match roof design and to match slope of roof such that top of curb is level. See Section *Ductwork Accessories* for Roof Curb information.
3. Vertically mounted condenser coils shall be protected with manufacturer approved louvered panels or neat expanded metal hail coil guards installed a minimum of two (2") inches off face of coil. See detail on Contract Drawings.
4. The unit shall be as a double wall design, with interior sandwiched rigid insulation between inner/outer panels. All access panels and doors shall be of same double wall configuration.
5. Access to compressor(s), controls, filters, blower, heating section, and other items needing periodic checking or maintenance shall be through hinged access doors with a quarter turn latch (door fastening screws are not acceptable).
6. Airside service access doors shall be fully gasketed with rain break

overhangs.

7. Unit exterior shall be painted with a colored polyurethane paint over a wash primer and a G90 galvanized steel. Exterior custom colored factory finish shall be as approved by ARCHITECT.
8. Wiring shall be color coded and marked on each end.
9. To guarantee no leakage of conditioned air from the cabinet all of the cabinet under positive pressure downstream from the supply air blower, shall have a separate internal cabinet contained within, and separate from, the exterior cabinet by an air gap. The internal cabinet shall be guaranteed to hold a static pressure of up to 6 inches water column.
10. All openings through the base pan of the unit shall have upturned flanges of at least 1/2" in height around the opening through the base pan.
11. Unit shall have decals and tags to indicate unit lifting - rigging, service areas and caution areas.
12. Wiring diagrams shall be in color and marked to match the color and markings of the wires and shall be both "point-to point" and "ladder" diagrams.
13. Diagrams shall also be laminated in plastic and permanently fixed to the control compartment door.
14. Exterior custom colored factory baked enamel finish shall be as approved by ARCHITECT.
15. Provide a fully gasketed airtight seal between unit and curb.
16. The unit roof design shall be cross-broken and/or sloped to assure drainage.
17. Condenser Hail Coil Guards: On units with condenser coils that are installed within 15° of vertical, provide heavy-duty louvered or approved expanded metal, factory primed and painted to match unit enclosure and mounted in a rigid frame with a minimum of 2" clearance to coils.

B. Insulation:

Minimum one inch (1") thick and 1-1/2 pound density on all exterior unit sandwich casings and on baffles separating differing air streams. Insulation shall meet the requirements of NFPA Standard 90A and be protected against deterioration and delamination from air currents. Insulate stainless steel condensate drain pan with water impervious insulation of sufficient thickness to prevent condensate formation on the exterior at ambient conditions encountered.

C. Evaporator Fan:

Forward curved type (or backward inclined) DWDI Class I centrifugal type specifically designed and suitable for the operating pressure conforming to AMCA 210. Provide adjustable pitch pulley with a minimum rating of 140% of the motor nameplate brake horsepower when the adjustable pulley is at the minimum RPM. Direct drive plenum fans with VFD may be substituted for belt drive assembly. Units shall have permanently lubricated ball bearings. Statically and

dynamically balance fan assemblies in the fan housing and final assembly. Fan motors above 1 HP to be isolated with spring isolators. Fan motors and starters shall conform to Section *Electrical Requirements*. Motor starters shall conform to NEMA ICS. Motors shall have thermal overload and other protection per Section *Electrical Requirements*. Where motors exceed 5 HP, provide soft/start magnetic motor starters. Three phase motors shall have protection from phase loss, phase reversal and high/low voltage. See Section *Electrical Requirements*.

D. Compressors:

1. Provide hermetic scroll type conforming to ARI 520, provided with all minimum standard equipment and accessories listed therein.
2. All units over 7 tons shall have minimum two independent refrigerant circuits.
3. Compressor(s) shall be mounted in an isolated compartment to permit operation of the unit without affecting supply or return/exhaust air flow when the compressor compartment is open.
4. Compressors shall have internal thermal overload protection.
5. Three phase compressors shall have protection from phase loss, phase reversal and high/low voltage with automatic restart capability. See Section *Electrical Requirements*.
6. Compressors shall be mounted on manufacturer's recommended rubber vibration isolators.
7. Compressor(s) shall be isolated from the base pan and supply air to avoid any transmission of noise or vibration from the compressor into the building area or structure.
8. System shall be equipped with thermostatic expansion valve(s) type refrigerant flow control.
9. System shall be equipped with automatic re-set low pressure and manual reset high-pressure refrigerant controls.
10. Unit shall be equipped with Schrader type service fittings on both the high side and low-pressure sides of the system.
11. Unit shall be equipped with refrigerant liquid line driers on all circuits.
12. Unit shall be fully factory charged with refrigerant R-22.
13. All circuits shall be provided with hot gas by-pass (factory installed).
14. All circuits shall be equipped with liquid line sight glasses.
15. Unit shall be equipped with low limit temperature, a five (5) minute anti-short cycle delay timer for each compressor and automatic restart controls.
16. Unit shall be equipped with 20-second-between-stage delay adjustable timer for each compressor/circuit.
17. Three phase compressors and motor loads shall be protected from over

and under voltage and phase loss with automatic restart capability.

18. Unit shall be equipped with a refrigerant condenser reheat coil in the discharge air stream, a proportional modulating hot gas reheat valve, and a complete microprocessor based control system including an adjustable set point temperature controller for duct mounting and sensing.
19. Individual compressor isolation valves shall be provided where compressors are installed in tandem arrangement on the same refrigerant circuit.

E. Coils:

1. Refrigerant and water heating, condenser and cooling coils shall be copper type with aluminum fins and conform to ARI 410 and be tested for 425 p.s.i.g. Evaporator coils shall be minimum 6-row high latent capacity design; multi circuit evaporators shall be split face configuration.
2. Condensing Coils for Multi Compressors: Provide a separate air cooled condenser circuit for each compressor in multi compressor installations. If compressors are paralleled, provide not less than two independent circuits. A common housing may be used, but each coil must be provided with separate controls to operate individual fans for each coil. All coils shall be sized for a minimum of 10 degrees sub-cooling. The air cooled condenser coil shall be extended surface fin and tube with seamless copper tubes with aluminum fins. The coils shall be tested for 425 psi. In the event one compressor fails, the other compressor(s) shall continue to operate on the other independent circuit.
3. Provide insulated stainless steel drain pan under all cooling coils with positive slope to single outlet per ASHRAE 62-2001.
4. A manufacturer's non-prorated parts and labor warranty on the refrigeration system is required when microchannel condenser coils are utilized.

F. Filter Section:

Provide filter boxes with hinged access doors for supply and return/exhaust sections. Provide adjustable setpoint differential pressure sensors and annunciate to control panel specified hereafter. Filters shall be of the high velocity two inch (2") thick, replaceable type to serve the airflow capacity indicated on Contract Drawings. See Section *Air Cleaning/Treatment*.

G. Mixing Boxes:

Physical size shall match the basic unit and include equal sized flanged openings, each sized to handle full airflow. Provide outside air, exhaust air and bypass modulating airfoil parallel blade motorized dampers with spring returns on each. Provide weather hood to protect ventilation intake and exhaust discharge, both with heavy duty expanded aluminum bird screen cover.

H. Heating Section:

1. Primary heating capacity for supplemental and dehumidification application shall be in re-heat position.

2. Primary heating shall be indirect fired gas heat in reheat position and shall be controlled by unit integral temperature and humidity controls. This is supplemental to what is provided by enthalpy heat wheel and refrigerant reheat.
- I. Outside and Exhaust Air Capacity/Capability:
(HRU) Heat Recovery Unit shall be up to 100% with a motor operated modulating outside air and exhaust air damper constructed of extruded aluminum hollow core, air foil blade with rubber edge seals and aluminum end seals. Damper blades shall be gear driven and designed to have no more than 25 CFM of leakage per square foot of damper area when subjected to 2" WG air pressure differential across the damper. Damper motor shall be spring return to ensure closing of outdoor air damper during periods of unit shut down or power failure. Provide damper position verification controls.
 - J. Heat Recovery Control/Capability:
 1. The rooftop unit shall have a factory mounted and tested enthalpy heat wheel. The heat wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings. These components will form a cassette, which shall be removable from the unit without the use of tools.
 2. The energy recovery cassette shall contain a total energy recovery heat wheel constructed of a lightweight polymer material with permanently bonded desiccant coating. The energy recovery wheel media shall be capable of removal from the cassette and replacement without the use of tools. Wheel media shall be cleanable using hot water or light detergent without degrading the latent efficiency. See schedule on Drawings for other capacity and capability requirements.
 - K. Power Safety and Auxiliary Electric Controls and Accessories:
 1. Unit shall be provided with a factory installed and wired internal disconnect switch with fusing. Unit shall be provided with phase reversal and brown-out protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage, reversed or the voltage is more than 10% under design voltage. These electrical controls shall include automatic restart capability. Unit shall be provided with a factory installed and wired 115 volt, 15 amp ground fault service receptacle.
 2. A NEMA 3R fused disconnect switch shall be factory installed and unit mounted for single point connection.
 - L. Controls:
 1. Unit shall be factory provided with a BACNET MSTP interface "card" to allow Owner's building EMS to read, reset, and control unit operation from remote workstation, etc.
 2. Dehumidification and Thermostatic Control:
 - a. Duct and Remote Sensor Type:
Temperature and humidity sensors shall be factory provided and

- field remotely mounted where shown and factory recommended to accomplish specified control sequence and performance. Mount all other controls including motor starters and safety controls inside the enclosure. All wiring inside enclosure shall be accomplished at the factory. Control panel shall include magnetic contactors for compressor, evaporator and condenser fan motors, three leg compressor overloads high and low pressure cutouts, oil pressure cutouts, non-recycling pump down and reset relay.
- b. Factory automatic heating/cooling temperature changeover and humidity controls shall be capable of maintaining within +/- 3 degrees F. and 3% R.H., of ENGINEER specified set point. Relative humidity sensor shall be self-calibrating and have a range of 5-100%, non-condensing and be accurate within +/-3% RH of set point. Set point shall vary seasonally with automatic controls as hereafter specified.
 - c. It is intended that systems provide active upper limit humidity sensing and control during all periods. Thermostatic control shall include discharge air temperature sensing and control during facility occupied periods and space temperature sensing and control during facility unoccupied periods.
3. Condenser Controls:
- Provide head pressure control with variable speed condenser fans to insure condensing temperature for proper system operation at all ambient temperatures down to 0 degrees F. Condenser fans to be heavy duty permanently lubricated ball bearing type with built in thermal overload protection.
4. Condenser Start Up Control:
- Provide condenser with a startup control package which permits startup of compressor at ambient temperature of 0 degrees F. Package shall temporarily by pass system low pressure start to permit start up whenever minimum ambient temperature is below design evaporator coil suction temperature.
5. Primary Heating Section:
- a. Automatic controls furnished, as standard equipment, shall give minimum four-stage operation (from 30% to 100% of maximum schedule capacity) for primary application sequencing, and additional stages for specified multi-stage applications.
 - b. Stainless steel gas-fired heat exchanger shall have pre-purge, electric spark ignition, 100% safety shutoff controls, electronic flame sensing controls, series gas valves and limit controls. Staging control shall be with separate gas valves. All controls shall be listed for operation at low outdoor air temperatures. Burner shall be equipped with inspection window and air shutter for combustion air adjustment. Complete service access shall be

provided for controls and wiring. Shall be A.G.A. design certified for outdoor installation.

6. Control/Monitoring Panel:

a. General:

Each unit shall have a control/monitoring panel unit mounted.

b. Alarm functions:

- i. The control/monitoring panel shall be capable of annunciating alarm conditions through the use of either a minimum 1" red pilot light or audible device. If an audible alarm is utilized, the alarm shall be capable of being silenced upon the OWNER'S acknowledgement of the alarm. If a pilot light is utilized, the pilot light shall be located in building.
- ii. The following minimum alarms shall be set up for each individual outside air unit:
 - (1) Fan Failure – this shall be accomplished through the use of either an air pressure switch or current switch.
 - (2) Filter Maintenance – this shall be accomplished through the use of a clogged filter switch. Provide an alarm for each and every air filter bank.
 - (3) Compressor Maintenance – this shall be accomplished through the use of a duct mounted relative humidity sensor in the outside air duct discharge from the unit. This alarm feature shall only be available when the cooling is energized and shall be initially set at 70% R.H. (adjustable).
 - (4) Heating Mode Low Limit Temperature – this shall be accomplished through custom programming of the duct mounted discharge air temperature sensor, and initially set to 40 degrees F.
 - (5) Heating Mode High Limit Temperature – this shall be accomplished through custom programming of the duct mounted discharge air temperature sensor, and initially set to 85 degrees F.
 - (6) High Limit Zone Relative Humidity – this shall provide both audible and visible annunciation and shall be initially set to annunciate upon a rise in relative humidity above 70% RH.

c. Display and Control Capability:

- i. Panel shall also be capable of displaying, digital or LED, the following:

- (1) Discharge air temperature (db) °F.
 - (2) Space temperature (db) °F.
 - (3) Outside air temperature (db) °F.
 - (4) Outside air temperature (wb) °F.
 - (5) Space relative humidity (% RH).
 - (6) Control setpoints.
 - ii. Panel shall allow user from a user friendly menu, to modify control input and strategy, with password protection.
 - d. Trend logs:

Trend logs of pertinent on-going unit and zone hourly temperature and humidity history shall be transmitted to ENGINEER beginning two (2) weeks prior to scheduled substantial completion for any phase, and continuing till thirty (30) days after OWNER'S final acceptance of project. The CONTRACTOR shall continue to provide trend log data to PROFESSIONAL, beyond this period, as requested, when system fails to perform consistently and satisfactorily as indicated. The following minimal information shall be included on these trend logs and recorded once every hour:

 - i. Outside air entering air temperature (db/wb).
 - ii. Evaporator coil leaving air temperature (db/wb).
 - iii. Unit leaving air temperature (db/wb).
 - iv. Indoor relative humidity level (%).
 - v. Space indoor temperature (db).
 - e. Remote monitoring and annunciation capability:
 - i. The system controls shall include the capability, hardware, and software to be monitored via phone modem interface, to any OWNER's computer workstation, and for Vendor's use for monitoring during the warranty period.
7. Hot Gas Bypass Controls:
- The unit shall be equipped with hot gas by-pass controls on all refrigerant circuits to protect against evaporator frosting at low air volume, low ambient, and suction pressure.
8. Refrigerant Circuits:
- Dehydrate entire refrigerant circuit, purge, and charge with refrigerant and oil at factory. Factory oil charge shall be the full amount required for operation. Factory charge for refrigerant shall be the full amount required for operation, if within limits permitted by Interstate Commerce Commission, otherwise furnish a holding charge of the type refrigerant to be used.

9. General Control Requirements:

In general factory controls shall be comprehensive, except for time of day and/or normally unoccupied period automatic override controls and sequencing. All temperature and humidity controls for unit sequencing shall be factory provided and unit mounted, except for minor duct and/or space specified sensors, and remote control panels etc. CONTRACTOR shall provide all other controls, interlocking control wiring, labor and installations not factory provided or mounted. Damper status/position verification switches shall be included for fan safety "startup".

10. CONTROL SEQUENCE

a. GENERAL

- i. UNIT MANUFACTURER SHALL FURNISH AND INSTALL NEW ELECTRIC/ELECTRONIC CONTROLS, COMPLETE WITH SENSORS, TRANSMITTERS, CONTROLLERS, SWITCHES, AND ALL ASSOCIATED INTERLOCKS, WIRING IN METALLIC CONDUIT, ETC., FOR COMPLETE AND FUNCTIONAL SYSTEM. DUCT MOUNTED SMOKE DETECTORS PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR WITH INTERLOCKS FOR FIRE ALARM SAFETY UNIT SHUT DOWN BY CONTROLS CONTRACTOR. CONTROLS ARE TO BE STAND ALONE FOR EACH UNIT. REMOTE AND DUCT MOUNTED CONTROLS, SENSORS, ETC., SHALL BE FACTORY PROVIDED AND CONTROLS CONTRACTOR INSTALLED. ALL FIELD CONTROL/INTERLOCK WIRING OF FACTORY AND/OR FIELD SUPPLIED CONTROL PANELS, SENSORS, ETC., BY CONTROLS CONTRACTOR, INCLUDING MOUNTING OF CONTROL PANELS, SENSORS, ETC., FURNISHED WITH UNIT.
- ii. THE RESPONSIBILITY FOR ALL CONTROLS AND SEQUENCE SHALL REMAIN WITH, AND BE THE RESPONSIBILITY OF, THE EQUIPMENT MANUFACTURER.
- iii. RETURN, EXHAUST AND OUTSIDE AIR DAMPERS SHALL HAVE SPRING RETURN TO AUTOMATICALLY CLOSE OUTSIDE AND EXHAUST AIR AND OPEN RETURN DAMPERS WHEN CONTROLS ARE DEENERGIZED OR FANS IS OFF.
- iv. UNIT SHALL BE FACTORY PROVIDED WITH A BACNET MSTP INTERFACE "CARD" TO ALLOW OWNER'S BUILDING EMS TO READ, RESET, AND CONTROL UNIT OPERATION FROM REMOTE WORKSTATION, ETC.

b. SEQUENCE OF OPERATION

- i. START/STOP/SAFETIES

- (1) UNIT SUPPLY AND EXHAUST BLOWER MOTORS/FANS, REFRIGERATION, HEATING, TEMPERATURE AND HUMIDITY CONTROLS SHALL BE ENERGIZED BY TIMECLOCK BASED CONTROLS WHEN FAN STARTER "HAND-OFF-AUTO" SWITCHES ARE IN "AUTO" POSITION. CONTROLS OF UNIT AND FANS SHALL BE DE-ENERGIZED FOR THE FOLLOWING:
 - (2) BY ANY SMOKE DETECTOR(S) DUCT MOUNTED NEAR UNIT.
 - (3) BY FIRE ALARM ANNUNCIATION SERVING SAME ZONE(S) SERVED BY SAME UNIT. CONTROLS CONTRACTOR SHALL PROVIDE WIRING BETWEEN FIRE ALARM PANEL AND UNIT TO ACCOMPLISH THIS REQUIREMENT.
 - (4) CONDENSATE DRAIN AUXILIARY OVERFLOW DETECTION DEVICE (DRAIN PAN FLOAT SWITCH).
- ii. OCCUPIED MODE
 - (1) O/A AND E/A MOTORIZED TWO-POSITION DAMPER SHALL OPEN COMPLETELY.
 - (2) R/A MOTORIZED TWO-POSITION DAMPER SHALL BE CLOSED.
 - (3) THE UNIT SHALL BE PROVIDED WITH VFD(s) TO CONTROL THE SUPPLY AND EXHAUST FAN MOTOR SPEED. THE FAN SPEEDS SHALL BE SET AT A FIXED SPEED IN CONJUNCTION WITH TAB FOR SCHEDULED UNIT AIRFLOW.
 - (4) ENTHALPY HEAT WHEEL SHALL BE ENERGIZED ANYTIME AMBIENT TEMPERATURE (T1) IS ABOVE 72° F. (ADJUSTABLE) OR BELOW 55° F. (ADJUSTABLE). OTHERWISE HEAT WHEEL SHALL BE OFF.
 - (5) DURING COOLING AND DEHUMIDIFICATION CYCLES, REFRIGERATION SHALL BE SEQUENCED BY MANUFACTURER'S DETERMINED CONTROL STRATEGY USING TEMPERATURE, HUMIDITY, DEW POINT, ETC. TO MAINTAIN AN EVAPORATOR COIL LEAVING AIR TEMPERATURE IN A RANGE OF 50 TO 56 DEGREES F. COOLING CYCLE SHALL BE ENABLED ANYTIME OUTDOOR AIR TEMPERATURE IS ABOVE 56 DEGREES F. DURING COOLING CYCLE, UNIT DISCHARGE AIR

TEMPERATURE SHALL BE SET INITIALLY TO MAINTAIN 55 DEGREES F AND BE RESET IN ACCORDANCE WITH THE FOLLOWING RESET SEQUENCE.

- (a) WHEN OUTSIDE AMBIENT TEMPERATURE IS EQUAL TO OR GREATER THAN 80 DEGREES F, UNIT DISCHARGE AIR TEMPERATURE SHALL BE SET AT 55 DEGREES F AND REFRIGERANT HOT GAS REHEAT SHALL BE DISABLED. WHEN OUTSIDE AIR TEMPERATURE IS 56 DEGREES F, UNIT DISCHARGE AIR TEMPERATURE SHALL BE SET AT 65 DEGREES F. THE UNIT DISCHARGE AIR TEMPERATURE SHALL BE VARIED LINEARLY BETWEEN THESE TWO POINTS. REFRIGERANT HOT GAS REHEAT VALVE SHALL BE MODULATED TO ACHIEVE THIS DISCHARGE AIR TEMPERATURE SETPOINT WHEN OUTDOOR AMBIENT TEMPERATURE IS LESS THAN 80 DEGREES F.
- (b) IF THE SPACE RELATIVE HUMIDITY RISES ABOVE 65% RH, NO MATTER THE CURRENT SETTING OF THE SYSTEM THE UNIT SHALL ENABLE A DEHUMIDIFICATION CYCLE. DURING THIS DEHUMIDIFICATION CYCLE, ALL COMPRESSORS SHALL BE ENERGIZED AND REMAIN ENERGIZED UNTIL SPACE RELATIVE HUMIDITY FALLS BELOW 55% RH. UNIT DISCHARGE SUPPLY AIR TEMPERATURE SHALL BE MAINTAINED AS NOTED ABOVE. HOWEVER, THE REFRIGERANT HOT GAS REHEAT VALVE SHALL BE ENABLED AND MODULATED TO MAINTAIN A UNIT DISCHARGE AIR TEMPERATURE LOWER LIMIT SETPOINT OF 50 DEGREES F.
- (6) HEATING CYCLE SHALL BE ENABLED ANYTIME OUTDOOR AIR TEMPERATURE IS BELOW 56 DEGREES F., DURING WHICH REFRIGERANT HOT GAS REHEAT SHALL BE DISABLED. NATURAL GAS HEATING SHALL BE SEQUENCED BY MANUFACTURER'S DETERMINED CONTROL STRATEGY TO MAINTAIN UNIT DISCHARGE AIR TEMPERATURE OF 65 DEGREES F. THIS UNIT

DISCHARGE AIR TEMPERATURE SHALL BE RESET IN ACCORDANCE WITH THE FOLLOWING RESET SEQUENCE.

- (a) WHEN OUTSIDE AMBIENT TEMPERATURE IS EQUAL TO OR LESS THAN 35 DEGREES F, UNIT DISCHARGE AIR TEMPERATURE SHALL BE SET AT 70 DEGREES F. WHEN OUTSIDE AIR TEMPERATURE IS 56 DEGREES F, UNIT DISCHARGE AIR TEMPERATURE SHALL BE SET AT 65 DEGREES F. THE UNIT DISCHARGE AIR TEMPERATURE SHALL BE VARIED LINEARLY BETWEEN THESE TWO POINTS.

iii. UNOCCUPIED PERIODS:

- (1) UNIT CONTROLS SHALL BE ENABLED AT ALL TIMES. SUPPLY FANS, COOLING, DEHUMIDIFICATION AND HEATING SHALL BE SEQUENCED TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY SETPOINTS, WITHIN GUARANTEED +/-3 DEGREES F., AND WITHIN +/-3% RH OF SETPOINT.
 - (a) COOLING SET-UP SPACE TEMPERATURE SHALL BE INITIALLY SET AT 80 DEGREES F.
 - (b) HEATING SET-BACK SPACE TEMPERATURE SHALL BE INITIALLY SET AT 50 DEGREES F.
 - (c) A ZONE DEHUMIDISTAT SHALL SEQUENCE REFRIGERATION AND REFRIGERANT HOT GAS REHEAT CAPABILITY SIMULTANEOUSLY TO MAINTAIN A MAXIMUM 60% RH SETPOINT. IF THE SPACE RELATIVE HUMIDITY RISES ABOVE 65% RH, NO MATTER THE CURRENT SETTING OF THE SYSTEM, ALL COMPRESSORS AND FULL HOT GAS REHEAT CAPABILITY SHALL BE ENERGIZED AND REMAIN ENERGIZED UNTIL SPACE RELATIVE HUMIDITY FALLS BELOW 55% RH.
- (2) O/A AND E/A MOTORIZED DAMPER SHALL BE CLOSED COMPLETELY AND R/A MOTORIZED DAMPER SHALL OPEN COMPLETELY.
- (3) WHEN A CALL FOR COOLING,

DEHUMIDIFICATION OR HEATING OCCURS, SUPPLY FAN SHALL BE ENERGIZED. SUPPLY FAN CONTROL SHALL BE SAME AS OCCUPIED SEQUENCE OF OPERATION ABOVE. EXHAUST FAN SHALL REMAIN OFF.

M. Warranty – See Section *Mechanical Systems and Equipment Warranties*.

PART 3 – EXECUTION

3.1 INSTALLATION

Handle and install units and accessories in accordance with ARI 260 and the manufacturer's printed instructions. Unit shall be started up and checked out by a factory service representative. CONTRACTOR shall furnish ENGINEER test report covering unit operation.

3.2 TESTS

Perform tests and make reports in accordance with Section *Basic Mechanical Materials and Methods and Testing, Adjusting and Balancing*.

3.3 TESTING, ADJUSTING, AND BALANCING COORDINATION

CONTRACTOR shall coordinate with unit manufacturer to have a factory representative present on the day(s) the TAB Agency performs scope of work described in Section Testing, Adjusting and Balancing in order to assist TAB Agency in testing all functions of units including controls, sequence of operation, safeties, alarms, etc.

3.4 UNIT CAPACITY

Characteristics and capacity of systems shall be as indicated on Contract Drawings.

3.5 CONTROLS:

All systems will be provided with factory comprehensive DDC/electronic controls. Provide auxiliary time clocks or setup/setback thermostats and dehumidistats, etc., as required to provide specified control sequence.

END OF SECTION

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SECTION 230860 - FANS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work included: Fans for heating, ventilating and air conditioning.
- C. Product Definitions: AMCA Publication 99, Standard 1-66.

1.2 APPLICABLE STANDARDS

- A. Fans and power ventilators shall be listed in the current edition of AMCA 261, and shall bear the AMCA performance seal.
- B. Operating Limits for Centrifugal Fans: AMCA 99 (Class 1, 11, and 111).
- C. Fans and power ventilators shall comply with the following standards:
 - 1. Testing and Rating: AMCA 210.
 - 2. Sound Rating: AMCA 300.
- D. Performance Criteria:
 - 1. The fan schedule shows CFM and design static pressure. Scheduled fan motors, ½ horsepower and larger, are to be sized for design CFM at 110 percent design static pressure, but not to exceed ¾-inch additional pressure.
 - 2. Provide fans and motors capable of stable operation at design conditions and at 110 percent pressure as stated above.
 - 3. Lower than design pressure drop of approved individual components may allow use of a smaller fan motor and still provide the safety factor. When submitted as a deviation, a smaller motor may be approved in the interest of energy conservation.
 - 4. Select fan operating point as follows:
 - a. Forward curved and axial fans: Right hand side of peak pressure point.
 - b. Airfoil, backward inclined or tubular: Near the peak of static efficiency.
- E. Safety Criteria: Provide manufacturer's standard screen on fan inlet and discharge exposed to operating and maintenance personnel.

PART 2 – PRODUCTS

2.1 CENTRIFUGAL FANS

- A. General:
 - 1. Standards and Performance Criteria: Refer to Paragraph, QUALITY ASSURANCE.
 - 2. Construction: Wheel diameters and outlet areas shall be in accordance with AMCA standards.

- a. Housing: Low carbon steel, arc welded throughout, braced and supported by structural channel or angle iron to prevent vibration or pulsation, flanged outlet, inlet fully streamlined. Provide lifting clips, and casing drain. Provide manufacturer's standard access door. Provide screens for fan inlets without duct connections.
 - b. Wheel: Steel plate with die formed blades welded or riveted in place, factory balanced statically and dynamically.
 - c. Shaft: Designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fans class.
 - d. Bearings: Heavy-duty ball or roller type sized to produce a B10 life of not less than 40,000 hours, and an average fatigue life of 200,000 hours. Extend lubrication tubes for interior bearings or ducted units to outside of housing.
 - e. Painting: AMCA Standard preparation for coating 2601-66-1E33, followed by manufacturer's standard rust resistant baked enamel colored coating inside and out.
3. See Section *Electrical Requirements* for motor and starter requirements.
 4. See Detail on Drawings for roof curb construction requirements.
- B. Exhaust Air Fans
1. Direct Drive Roof Mounted Type:
 - a. Fan shall be of the direct drive centrifugal type. Construction of fan housing shall be heavy gauge spun aluminum, mounted upon a rigid support and bird screen network of poly-vinyl-chloride coated steel. The fan inlet shall have a spun venture throat overlapped by a backward curved centrifugal wheel with spun cone for maximum performance.
 - b. The motor and drive housing shall be mounted on vibration isolators and shall be completely sealed from the exhaust air.
 - c. The motor and wheel shall be removable through the support structure without dismantling the fan housing.
 - d. See Detail on Drawings for roof curb construction requirements.
 - e. Capacity and characteristics shall be as indicated on Contract Drawings. The fan shall bear the A.M.C.A. Seal for rated sound and capacity.
 2. Direct Drive Above Ceiling Type:
 - a. Fan shall be mounted above ceiling and vent routed as indicated. Fan shall have forward curved wheel constructed of aluminum. Fan motor shall be of the shaded pole type. Housing shall be of the steel construction with baked enamel finish. Grille mounted in ceiling shall be of extruded aluminum.
 - b. Capacity and characteristics shall be as indicated on Contract

Drawings.

3. Sidewall Exhaust Fan:
 - a. Horizontal Discharge arrangement centrifugal fan with mounting bracket and curb cap. Fan shall be constructed of aluminum with non-overloading backward inclined type blower, statically and dynamically balanced.
 - b. Blades, fins, inlet cones and back panels shall be securely fastened into a rigid assembly.
 - c. Motor end drive to be isolated from exhaust air stream. Motor shall be of heavy duty type with permanently lubricated, sealed ball bearings.
 - d. Air for cooling the motor shall be taken into the motor compartment by means of an air tube from a location free of discharge contaminants.
 - e. The entire motor and drive assembly shall be removable thru the support structure without dismantling the fan housing.
 - f. Fan drives shall be sized for a minimum of 150% of driven horsepower. Pulley shall be of the adjustable type.
 - g. Capacity and characteristics as indicated on Contract Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fan, motor and drive in accordance with manufacturer's instructions.
- B. Align fan and motor sheaves to allow belts to run true and straight.
- C. Bolt equipment to curbs with galvanized lag bolts, number and location per manufacturer's instructions.

3.2 PRE OPERATION MAINTENANCE

- A. Grease bearings and install maintenance notation chart per Section *Basic Mechanical Materials and Methods*.
- B. Rotate impeller by hand and check for shifting during shipment and check all bolts, collars, and other parts for tightness.

3.3 START UP AND INSTRUCTIONS

Check vibration and correct as necessary for air balance work.

3.4 ACCESSORIES

Provide all accessories including roof curbs, solid state speed controllers, wall mounting collars, insect and/or bird screen, OSHA approved motor and inlet/outlet protecting guards, back draft damper (motorized or manual as indicated), thermostats, vibration isolators and starters with pilots, etc., as indicated or required.

END OF SECTION

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SECTION 230885 - AIR CLEANING/TREATMENT

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Descriptions:
 - 1. Air filters for Heating, Ventilating and Air Conditioning.
 - 2. Definitions: Refer to newest edition of ASHRAE 52.2 for definitions of face velocity, net effective filtering area, media velocity, resistance (pressure drop), minimum efficiency reporting value (MERV), etc.

1.2 APPLICABLE STANDARDS

Air Filter Performance Report for Extended Surface Filters:

- A. Submit a test report for each type of filter being offered. The report shall be less than two years old and have been prepared by an independent testing laboratory using test equipment, method and duct section as specified by ASHRAE Standard 52.2-1999 for type filter under test and acceptable to ENGINEER, indicating that filters comply with the requirements of this specification. Test for 500 fpm will be accepted for lower velocity filters provided the test report of an independent testing laboratory complies with all the requirements of this specification.
 - 1. Selection procedures for manufacturer's standard products: All filters tested shall have been procured by the independent testing laboratory from the open market independent of manufacturer of these filters and a statement to this effect must accompany test report.
 - 2. Selection procedures for new products not available on open market: Testing laboratory will certify that filters are not available in areas remote from manufacturer's facilities. For each required test the independent Testing Laboratory shall select from the manufacturer's stock or production the number of samples required. The samples selected shall be representative of standard production considering media utilized and manufacturing locations. These test reports shall be less than six months old.
- B. Filter Supplier Warranty for Extended Surface Filters: Guarantee the filters against leaks, blow-outs, and other deficiencies during their normal useful life. Defective filters shall be replaced at no cost to the Owner.
- C. Identification: Each filter shall bear markings indicating manufacturer's name, filter size, and MERV & MERV-A ratings per ASHRAE Standard 52.2.
- D. Definitions and Abbreviations
 - 1. Spares: Filter(s) in sets to be turned over to the OWNER at the end of the project for the OWNER'S use after the project or any portion thereof, is complete.
 - 2. Construction Period: This term generally includes the time period beginning

with the OWNER'S notice-to-proceed and ending with the OWNER'S final acceptance of a project, or any phase of a project.

3. Temporary: A term generally depicting the use of air filters for use during the construction period.
4. Filter Grille: An inlet device connected to an HVAC system where an air filter is to be installed and maintained during construction and permanently after project is completed.
5. Pleated Filters: An extended surface filter with folds of air filtration media.
6. Filter or Filter Set: Air filter(s) in sizes as recommended by equipment or supplier manufacturer to prevent air bypass and to provide the maximum face size and minimum velocity to promote longer filter life expectancy.
7. F/G: fiberglass

1.3 RESPONSIBILITY

- A. The CONTRACTOR is responsible for providing, monitoring and maintaining all air filtration specified provisions during the construction period.
- B. The CONTRACTOR is also responsible for providing spare sets of air filter(s) to the OWNER, labeled and in boxes for storage, for the OWNER'S use after the project is complete and at which time the OWNER assumes control of operation and maintenance functions for the systems. One of the filter spare sets shall be installed on the day of the final inspection by the PROFESSIONAL.

1.4 AIR FILTRATION PROTECTION REQUIRED

The following systems and installations shall be provided with proper air filtration prior to startup or use of the facilities new HVAC systems and existing or renovated HVAC systems in the area(s) affected by this project.

- A. All new air handling systems, including up-flow/horizontal furnaces, roof top packaged systems, outdoor air and heat recovery systems, blower coil, central station and built-up air handling system with water, or refrigerant coils.
- B. Filter grilles or registers.
- C. Ducted return air systems: Provide temporary air filtration over all return air grilles, registers and filter grilles (in addition to filters in frame of filter grille).

1.5 TYPE OF AIR FILTRATION REQUIRED

The following is a listing of generic equipment and installation air filtration requirements. The CONTRACTOR may submit alternate filter thickness(es) to match specific applications but shall not be less than that listed, for PROFESSIONAL'S approval. The CONTRACTOR shall verify size, including thickness matched to CONTRACTOR supplied equipment and air distribution device accessory.

AIR FILTRATION REQUIREMENTS					
GENERAL INFORMATION			CONSTRUCTION PERIOD FILTRATION	SPARES (PROJECT COMPLETION FILTRATION)	
FILTER FUNCTION/ LOCATION	FILTER TYPE	NOMINAL FILTER DEPTH/ THICKNESS	MINIMUM MERV & MERV-A RATINGS	MINIMUM MERV & MERV-A RATINGS	NUMBER OF SETS REQUIRED
RETURN AIR GRILLES/ REGISTERS	PLEATED	1"	11	N/A	N/A
AIR HANDLING UNITS	PLEATED	2"	8	8	3
HEAT RECOVERY UNITS (HRU'S)	PLEATED	2"	8	8	3
PTAC UNITS, (TWU)	WASHABLE	-	4	4	1
DUCTLESS MINI-SPLIT, (DSS)	WASHABLE	-	4	4	1
ROOFTOP UNITS, (RTU'S)	PLEATED	2"	8	8	3

PART 2 – PRODUCTS

2.1 EXTENDED SURFACE AIR FILTERS

- A. Filter shall be pleated, disposable type. Filter shall consist of non-woven cotton and synthetic fabric media, media support grid and enclosing frame.
- B. The filter shall be listed by Underwriters Laboratories as Class 2.
- C. The media support shall be a welded wire grid with an effective open area of not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull away.
- D. The enclosing frame shall be constructed of a rigid, heavy-duty beverage board with diagonal support members bonded to each side of the filter to insure pleat stability. The inside periphery of the enclosing frame shall be bonded to the filter pack to eliminate possibility of air bypass.
- E. Filter Characteristics

MINIMUM EFFICIENCY REPORTING VALUE (MERV & MERV-A)	FILTER DEPTH/ THICKNESS	PRESSURE DROP (IN. W.G. @ 350 F.P.M.)		PRESSURE DROP (IN. W.G. @ 500 F.P.M.)	
		INITIAL	FINAL	INITIAL	FINAL
8	1"	0.23	0.5	-	-
8	2"	-	-	0.29	0.75
11	1"	0.30	0.50	-	-
11	2"	-	-	0.35	0.75

PART 3 – EXECUTION**3.1 INSTALLATION AND COORDINATION**

- A. Install supports, filters and gages in accordance with manufacturer's instructions.
- B. At end of project, provide list of all HVAC air handling equipment and filter grilles, with size and quantity of air filters and MERV rating for each, and submit for Owner's future use and maintenance record. Furthermore, submit a letter signed by the OWNER acknowledging receipt of all spare sets of air filters outlined above. All boxes of air filters shall be labeled to match the individual HVAC system or return air filter grille location for which the filters are to be utilized.

3.2 START-UP AND TEMPORARY USE

- A. Clean and vacuum air handling units and plenums to the satisfaction of the ENGINEER prior to starting air-handling systems.
- B. Change out replaceable air filters, as filters are 60% loaded during construction use period and just prior to OWNER'S acceptance of project. Filters for use during construction period are in addition to OWNER'S spare sets, as specified herein.
- C. Thoroughly wash wall unit filters as filters are 40% loaded during construction period, and just prior to OWNER'S acceptance of project.

END OF SECTION

SECTION 230890 - DUCTWORK

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required including all supply, return, outside air, exhaust, and other ductwork and as required for the A/C system, including mains, branches, plenums, mixing boxes, fittings, accessories, and other related sheet metal work for a complete installation as specified herein and/or shown on Drawings.
- B. Work under this Section includes but is not necessarily limited to the following items: Ductwork for heating, ventilating and air conditioning systems.
- C. Construct ductwork to meet all functional criteria defined in the SMACNA "HVAC Duct Construction Standards - Metal and Flexible" Latest Edition. This shall be subsequently referred to as the SMACNA Manual.

1.2 APPLICABLE STANDARDS

APPLICABLE PUBLICATIONS: The publications listed below form a part of this Specification to the extent referenced. The publications are referenced in the text by the basic designation only.

- A. National Fire Protection Association (NFPA):
 - 1. 90A.....Air Conditioning and Ventilating Systems – Latest Edition
 - 2. 90B..... Warm Air Heating and Air-Conditioning Systems – Latest Edition
 - 3. 96.....Vapor Removal from Cooking Equipment – Latest Edition
- B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. Low Pressure Duct Construction Standards – Latest Edition
 - 2. Guidelines for Welding Sheet Metal – Latest Edition
 - 3. Duct Liner Application Standard – Latest Edition

1.3 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. Exposed Duct: Exposed to view in a finished room or outdoors.

1.4 QUALITY ASSURANCE

- A. The CONTRACTOR must comply with the enclosed specification in its entirety.
- B. At the discretion of the PROFESSIONAL, sheet metal gauges, reinforcing and sealant may be checked at various times during the construction period to verify all duct construction is in compliance.
- C. If during site observations the PROFESSIONAL finds changes have been made without prior approval, the CONTRACTOR will correct deficiencies identified to comply with this specification solely at the CONTRACTOR's expense.

- D. Duct penetrations and/or doors, etc., necessary for the PROFESSIONAL to observe the duct installations, shall be made/installed and repaired, etc. by this CONTRACTOR, in ductwork as selected by PROFESSIONAL, at no additional cost to the OWNER or PROFESSIONAL.
- E. All ductwork shall be installed un-insulated (except duct liner), subsequently sealed and observed/approved by PROFESSIONAL prior to insulating.

PART 2 – PRODUCTS

2.1 DUCTWORK PRESSURE CLASS CONSTRUCTION REQUIREMENTS

- A. Ductwork shall be constructed to meet or exceed the SMACNA Standards based upon the following table of ductwork type and function.

DUCTWORK FUNCTION	DUCTWORK TYPE	DUCTWORK PRESSURE CLASS (IN. W.G.)
Low Pressure Supply Air	Rectangular	2 (pos.)
Low Pressure Supply Air	Round or Oval	2 (pos.)
Low Pressure Return Air	Rectangular	2 (neg.)
Low Pressure Return Air	Round or Oval	2 (neg.)
Low Pressure Exhaust Air	Rectangular	2 (neg.)
Low Pressure Exhaust Air	Round or Oval	2 (neg.)
Low Pressure Outside Air	Rectangular	2 (pos. or neg.)
Low Pressure Outside Air	Round or Oval	2 (pos. or neg.)
Low Pressure Transfer Air	Rectangular	2 (pos. or neg.)
Low Pressure Transfer Air	Round or Oval	2 (pos. or neg.)

- B. Ductwork with the type not specifically indicated on Drawings shall be constructed to 2 in. w.g. unless upstream of terminal units (variable air volume boxes) which shall be constructed to 4 in. w.g.

2.2 RECTANGULAR DUCTWORK

- A. General Requirements
 - 1. Construct all rectangular ductwork with approved new prime G-90 or better galvanized steel sheet ASTM S27 (LFQ) with chemical treatment or as specified, with careful, neat, and accurate workmanship and with all joints and seams air tight. Longitudinal seams, transverse joints and bracing, sheet metal gauges and other construction details shall be as recommended in the latest edition of the ASHRAE Guide and SMACNA "HVAC Duct Construction Standards – Metal and Flexible", and as specified below.
 - 2. **The rectangular duct sizes as indicated on the Drawings are inside dimensions, or net free area.** All necessary allowances should be made in the sizes shown on the Drawings to accommodate internal insulation or acoustic lining.
 - 3. All ductwork shall be provided with any re-enforcements factory installed to meet the SMACNA pressure classifications listed in paragraph 2.01.
 - 4. Transitions shall have a ratio of at least 4 to 1 except where prevented by job conditions. In such case the transition shall be made as gradual as

possible.

5. All duct transitions from square to round shall be smooth square-to-round transitions. Spin-in fittings at the end of capped ducts are not acceptable.
6. Flanged (TDC or TDF) ductwork with reinforced gasketed joints shall be installed in the following applications:
 - a. Indoor ductwork with any dimension greater than 30 inches.
 - b. All indoor ductwork exposed to view regardless of size.
 - c. All outdoor ductwork regardless of size.
7. Rectangular ductwork exposed to weather shall be crowned to shed water.

B. Low Pressure Ductwork

1. Elbows shall be either mitered or radius type for 90 degree turns and radius only for all turns less than 90 degrees as indicated on the Drawings.
2. Mitered elbows shall be constructed using turning vanes in each mitered 90 degree turn. Turning vanes shall be galvanized steel of double-wall air foil design. Where ductwork is greater than or equal to 12" in the plane of the turn, install turning vanes with 4" minimum radius of curvature on a maximum of 4" centers. Where ductwork less than 12" in the plane of the turn, install turning vanes with 2" minimum radius of curvature on a maximum of 2" centers.
3. Curved elbows shall have a centerline radius of 1-1/2 times the cross-sectional dimension of the duct in the plane of the turn.
4. All rectangular branch connections to rectangular ducts shall be a lateral or radius type and include an externally adjustable factory fabricated air turning vane assembly. Where lateral types are installed, the length of the lateral shall be equal to one quarter of the duct width but in no case less than 4". Where radius types are installed, the centerline radius shall be 1-1/2 times the branch duct dimension in the plane of the turn.

2.3 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. Duct liner shall meet all of the following requirements and include independent testing lab verification of conformance with all of the following product characteristics.
 1. Duct liner shall be made of spun or flame attenuated fiberglass with a factory-applied edge coating and of thickness and density based upon the application listed below.
 - a. Indoor applications – 1" thick, 1-1/2 pcf density.
 - b. Outdoor applications – 1-1/2" thick, 1-1/2 pcf density.
 2. The thermal conductivity shall be equal to or less than 0.25 at 75 degree F. mean temperature.
 3. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B and shall not support microbial growth as tested in accordance with

ASTM G21 and G22.

4. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than 0.70 as tested per ASTM C 423 using a Type "A" mounting.

B. Comparable Products

1. Knauf "Ductliner EM"
2. CertainTeed "Toughgard"
3. Johns Manville "Linacoustic RC".

2.4 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK

- A. Concealed round ductwork shall be constructed with SMACNA minimum pressure classification of 2" w.g.
- B. Snap lock pipe is acceptable as long as all longitudinal and circumferential seams are sealed and screws as indicated in Part 3 - Execution.
- C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.

2.5 SPIRAL DUCTWORK

A. General Requirements

1. Provide all ductwork as indicated Drawings.
2. All ductwork shall be provided with any re-enforcements factory installed to meet the SMACNA pressure classifications listed in paragraph 2.01.
3. All exposed to view ductwork indicated to be painted shall include a factory paint grip finish.
4. Galvanized areas that have been damaged by welding shall be coated with corrosion resistant paint.
5. All duct and fittings shall be manufactured by the same company. Said company shall have been in the business of manufacturing spiral ductwork for at least ten years.
6. Manufacturer shall furnish ENGINEER certified copies of test data made by an independent laboratory covering all pipe and fittings.

B. Single Wall Circular and/or Flat Oval Type:

1. Spiral pipe shall have locked seams so made as to eliminate any leakage under the pressures for which the system shall be subjected.
2. Longitudinal seam duct shall have a fusion welded butt seam.
3. All fittings shall have continuous welds along all seams. All divided flow fittings shall be manufactured as separate fittings, not as tap collars welded into spiral duct sections.
4. Transitions shall have a ratio of at least 4 to 1 except where prevented by job conditions. In such case the transition shall be made as gradual as possible.

5. Elbows shall be fabricated to a center-line radius of 1.5 times the cross-section diameter. Elbows in diameters 3" through 12" shall be die stamped true radius type. All other elbows shall be gored construction with all seams continuously welded.
6. All 90 degree tees and 45 degree laterals shall have a radius entrance into the tap, produced by machine or press forming. The entrance shall be free of weld build-up, burrs or irregularities.
7. Pipe to pipe and pipe to fitting joints shall be by the use of fully welded angle/flanged connections. Bolt hole spacing for angle rings shall not exceed 6-inches. Neoprene gaskets or other suitable sealant shall be employed in the joining method.

C. Insulated Double Wall Circular and/or Flat Oval type:

1. The outer pressure sheet and the inner liner shall be manufactured from galvanized steel meeting ASTM A-527-67, separated by spaces.
2. The inner liner of all ductwork and fittings shall be perforated.
3. The construction is to include minimum insulation sandwiched between outer shell and inner liner to provide a thermal conductivity "K" factor of 0.27B/HR/sq.ft./in./degrees F. at 75 degrees mean temperature.
4. The construction shall have means to maintain positive concentricity of liner with shell and mechanical means to retain insulation against dislocation by assembly process. Adhesives of any type are prohibited unless the flame spread, smoke developed and sound attenuation tests were performed with the adhesives as used.
5. The insulation shall include a matte face to provide positive protection against the possibility of fiber entrainment and microorganism growth with independent test lab certification of compliance with ASTM G21 and G22.
6. Spacers shall be included between inner and outer sheet metal members to prevent liner insulation compression.
7. Outer wall construction shall meet or exceed all of the requirements listed herein for single wall round oval ductwork.

2.6 FLEXIBLE AIR DUCTWORK

- A. Insulated Flexible Air Duct: Factory made including mineral fiber insulation with maximum C factor of 0.16 (R=6) at 75 degrees F. mean temperature, encased with a low permeability moisture barrier metalized outer jacket, having a puncture resistance of not less than 50 Beach Units. Acoustic insertion loss shall be not less than 3db per foot of straight duct, at 500 Hz, based on 6-inch duct, air velocity at 2500 fpm.
- B. Flexible ducts shall be listed by Underwriters Laboratories, Inc., complying with UL 181. Ducts larger than 8-inches diameter shall be Class 1. Ducts 8-inches in diameter and smaller may be Class 1 or Class 2.
- C. Minimum working pressure for low and medium pressure systems: 6 inches w.g. positive, 2 inches w.g. negative.

- D. Duct Clamps
 - 1. Stainless steel strap with cadmium plated worm gear tightening device.
 - 2. Nylon tie wrap minimum ¼" wide.

2.7 FLEXIBLE DUCTWORK ELBOW SUPPORTS

Elbow supports shall be constructed of durable composite material and be fully adjustable to support flexible duct diameters 6" – 16". Elbow supports shall be UL listed for use in return air plenum spaces. Flexible ductwork elbow supports equal to Thermaflex FlexFlow Elbow.

2.8 JOINT SEALING

- A. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread and 50 smoke developed (dry state) compounded specifically for sealing ductwork. Use products as recommended by the manufacturer for low, medium or high-pressure metal duct systems.
- B. Tape/Gaskets in flanged joints such as TDC or TDF: Soft butyl rubber/elastomeric composition equal to Sticky Tape manufactured by Ductmate.

2.9 ROUND FABRIC DUCTWORK

- A. Exposed low-pressure ductwork shall be equal to DuctSox Sedona-Xm with permanent antimicrobial protective coating or approved equal.
- B. Provide all connectors, fittings, flow straightener/equalizers suspension system and adaptors by same manufacturer. All materials utilized shall have been tested and bear the UL label to be in compliance with the flammability and smoke developed limitations of NFPA 90A.
- C. See Drawings for clarity regarding most required accessories, configuration, length, etc.
- D. All exposed to view ductwork indicated to include a factory colored finish with colors as selected by OWNER.
- E. Fabric ductwork shall be warranted for ten (10) years, non-prorated, parts only.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with provisions of Section, *BASIC MECHANICAL MATERIALS AND METHODS*, particularly regarding coordination with other trades.
- B. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards and manufacturer's printed instructions.
- C. Fabricate ductwork based on field measurements of space available. Sizes on plans may be altered by the CONTRACTOR, when approved by the ENGINEER, to other dimensions without increasing air pressure friction losses where necessary to avoid interferences and clearance difficulties.
- D. All ductwork located outdoors shall be sealed water tight on all seams and connections.

- E. Provide duct transitions, offsets and connections to dampers, coils, and other equipment.
- F. Weld sheet metal in accordance with SMACNA, Guidelines for Welding Sheet Metal. Repair damaged galvanized areas with galvanizing repair compound.
- G. Each collar for outlet and intake devices on exposed ducts shall be flanged inward at the device mounting end, and the outside dimensions of the collar shall not be less than the overall flange dimensions of the devices attached thereto.
- H. At each location where exposed ductwork passes through finished walls, floors, or ceiling, install a neat sheet metal collar completely covering the rough opening in the building construction secured to ductwork with sheet metal screws.
- I. Provide UL approved flexible connectors per Section *Mechanical Sound and Vibration Control*.
- J. Construct casings, eliminators, and pipe penetrations in accordance with applicable SMACNA Standards. Design casing access doors to swing against air pressure so the pressure helps to maintain a tight seal.
- K. Install fire, smoke and combination fire/smoke dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test.
- L. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, or items and other installations above the ceiling through plenum grilles, paint the inside of the duct or above ceiling installations, with flat black paint to reduce visibility.
- M. Protection and Cleaning
 - 1. Adequately protect ductwork and equipment against physical damage and entry of foreign matter to the inside at all times both prior to and after installation into project.
 - 2. Cap open ends of ducts and equipment when not in operation.
 - 3. Clean ductwork and equipment prior to painting. See PAINTING section for specific requirements pertaining to surface preparation.
 - 4. Both the inside and outside of all ductwork and equipment shall be clean and free of dust, debris, foreign material, etc. prior to final acceptance of the project.
 - 5. Place equipment in first class operating condition, or return to source of supply for repair or replacement, as determined by PROFESSIONAL.
- N. Control Damper Installation:
 - 1. Provide necessary transitions required to install dampers which do not match the duct size indicated.
 - 2. Assemble multiple section dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.
 - 3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix

and seal permanently in place, only after stratification problem has been eliminated.

3.2 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. The following rectangular ductwork shall be interior acoustically lined:
 - 1. Ductwork within ten (10) feet of any supply or return fan for HVAC applications, except built-up R/A plenums.
 - 2. Ductwork within ten (10) feet of exhaust fans.
 - 3. Ductwork exposed to view indoors.
 - 4. Supply and Return ductwork located outdoors.
 - 5. Transfer air ductwork and plenums.
 - 6. Supply air plenums adjacent to air moving equipment, etc.
 - 7. Where specifically indicated on Drawings.
- B. The duct liner shall be applied to the flat sheet with 100% coverage of adhesive with the black matte surface facing the air stream.
- C. Ducts with the sides or bottom dimension exceeding 20" shall have the liner additionally secured with welded pins and speed clips or "Gripnails" on a maximum of 12" centers and within 3" of edges. Pins shall be cut close to the speed clips.
- D. Provide sheet metal nosing on all liner, where liner terminates and ductwork continues.
- E. All seams, exposed edges and leading edges of all longitudinal and cross-joints of the liner shall be coated with an approved white sealant "butter".
- F. Wet butter shall also be applied to duct to duct seams and connections simultaneously with the jobsite installation.

3.3 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK

- A. Screws shall be installed every 18" O.C. along longitudinal seams and minimum 6" from end connections
- B. Screws shall be installed every 4" on center, but not less than 4 equally spaced, on circumferential ductwork and fitting joints.
- C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.
- D. No dovetail field joints or fittings are allowed.

3.4 SPIRAL DUCTWORK

- A. Spun bell mouth connections shall be installed at each round take off from rectangular ductwork and/or plenums.
- B. Duct sealer shall be applied to the male end of the couplings and fittings. After the joint is slipped together, sheet metal screws shall be placed ½-inch from the joint head for mechanical strength. Sealer shall be applied to the outside of joint extending 3" on each side of the joint head and covering the screw heads.

3.5 FLEXIBLE AIR DUCTWORK

- A. Flexible ducts shall be installed with stainless steel strap or nylon tie wraps with sealant and as approved for UL 181, Class 1 installation. A "tightening gun" shall be utilized when installing nylon tie wraps.
- B. Flexible ducts shall not penetrate any wall, floor, partition or ceiling.
- C. Flexible duct shall be installed in continuous single pieces not over five (5') feet long, as straight and short as feasible, adequately supported.
- D. Centerline radius of bends shall be not less than two duct diameters.
- E. Flexible ductwork shall be suspended on 36" centers with a minimum 1-1/4-inch wide flat banding material.

3.6 JOINT SEALING

- A. **All ductwork joints and longitudinal seams shall be sealed airtight.** Sealant shall be visibly sealed on the exterior of duct, including all factory fittings, all connections, both longitudinal and circumferential.
- B. Duct tape (gray or foil type) shall NOT be utilized as a ductwork sealer.
- C. Elastomeric or hard cast duct sealer shall NOT be utilized on fire damper sleeve to duct connections.
- D. Utilize flanged style ductwork joining system in conjunction with tape/gasket for sealing breakaway joints and connections to fire, smoke and/or combination fire/smoke dampers.

3.7 DUCT LEAKAGE TESTS AND REPAIR

- A. ALL ductwork shall be sealed airtight, as specified herein. Designated ductwork, as hereafter identified, shall be field pressure tested and proven tight. Other ductwork, not specified to be field tested may be randomly inspected by PROFESSIONAL; any or all ductwork not found to be comprehensively sealed (by visual inspection) may be thereafter required to be field pressure tested, solely at PROFESSIONAL'S discretion, to prove air tightness to specified tolerances.
- B. The following ductwork shall be tested by the CONTRACTOR and witnessed and logged by a representative of the TAB Agency performing the work identified in *Section Testing, Adjusting and Balancing*. This includes all supply, return, exhaust, outside air, etc. trunk and all branch ducts, and plenums excluding flexible duct run-outs to individual air distribution devices, shall be tested and proven tight within specified tolerances.
 - 1. All Low Pressure Ductwork.
 - a. Test pressure shall be at pressure class construction requirements identified in Part 2 of this specification.
- C. Measured air quantity leakage test
 - 1. The CONTRACTOR shall use recently calibrated orifice run, manometers and portable blower as recommended by AABC.
 - 2. Instruments used for testing and balancing of system shall have been

calibrated within six months preceding tests and checked for accuracy prior to start of work.

3. Instruments shall be of a type normally recognized as adequate and accurate for the test contemplated. List type of instrument, manufacturer, serial number and latest calibration date as a part of the submitted test data.
4. Allowable Leakage
 - a. Low Pressure Ductwork shall have a maximum leakage of five (5) percent of design flow rate (cfm) for complete system or portions thereof. Summation of leakage for all sections shall not exceed the total allowable for a single system.
5. Verification: By TAB Agency. See attached Duct Test Log.

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SECTION 230910 - DUCTWORK ACCESSORIES

PART 1 – GENERAL

1.1 SCOPE

Ductwork accessories for HVAC including supply air, return air, outside air, transfer air and general exhaust systems.

1.2 APPLICABLE STANDARDS

- A. Refer to Paragraph, QUALITY ASSURANCE, in Section *BASIC METHODS AND REQUIREMENTS (MECHANICAL)*.
- B. Fire Safety Code: Comply with NFPA 90A
- C. Duct System Construction: Referenced SMACNA Standards are the minimum acceptable quality.
- D. Duct accessories exposed to the air stream, such as dampers turning vanes, extractors, etc. and access openings, shall be of the same material as the duct or provide at least the same level of corrosion resistance.

1.3 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. SMACNA duct pressure classification for Low Pressure: Static pressure rating up to 2 inches wg (water gauge), positive or negative, for rectangular ducts, and 1 inch wg for round ductwork.

PART 2 – PRODUCTS

2.1 TAKE-OFF FITTINGS

- A. Round ductwork take-offs shall be conical/bellmouth type or 45 deg lateral (shoe-tap) type. Provide take-offs with volume damper including continuous shaft, locking quadrant handle, nylon bushings and stand-off bracket. Located where indicated and accessible.
- B. Conical take-off fittings shall be equal to Flexmaster model CBD SOG with B03 option.
- C. 45 deg lateral (shoe-tap) take-off fittings shall be equal to Flexmaster model STOD with B03 option.

2.2 DAMPERS

- A. Rectangular Volume Dampers: Opposed blade, multi-louver type. Provide end bearing for all dampers. Quadrant or other operator for externally insulated duct shall have stand-off mount so operation is clear of the insulation.
- B. Backdraft Dampers: Self-operating, multi-blade damper to open fully on 0.06 inch wg pressure difference and close by gravity. Aluminum, 16 gauge frame, 0.023 inch blades of airfoil or elliptical shape, with tie-bar to connect blades for parallel operation. Provide resilient gasket for air seal and quiet operation. Blade pivots shall be in nylon bushings. Provide adjustable counter-balance weight(s) where

indicated or required to achieve specified performance.

2.3 DUCT ACCESS DOORS, PANELS AND SECTIONS

- A. Provide access doors, sized and located for maintenance work, upstream where possible, in the following locations:
 - 1. Each fire damper (for link service), fire/smoke damper, smoke damper and automatic control damper.
 - 2. Each duct mounted smoke detector.
 - 3. Each duct mounted coil.
 - 4. Each turn in grease ducts.
- B. Openings shall be as large as feasible in small ducts, 8" diameter minimum, with round spin-in access door and sash lock(s). Access sections in insulated ducts shall be double wall, insulated.
 - 1. For low and medium pressure rectangular ducts, provide Flexmaster Model SDSM with R6 insulation option, flange with stick on gasket and cable door retention accessories.
 - 2. For round and flat oval ducts provide Ruskin Model ADR.

2.4 SPUN ALUMINUM ROOF MOUNTED INTAKE/ RELIEF HOODS

- A. Exterior construction is heavy gauge aluminum. A prepunched mounting base includes an integral spun venturi to reduce pressure drop losses. The internal structure is constructed of galvanized steel for rigid support and includes a windband and birdscreen.
- B. Sizes shown designate throat size. Area of hood perimeter opening shall be not less than the throat area.
- C. Hoods shall be equal to Greenheck model GRS.

2.5 AIR DISTRIBUTION DEVICES

- A. Including supply, return, transfer and exhaust ceiling, floor and sidewall installation, aluminum gasketed construction as indicated. Provide steel construction and matching UL Listed ceiling radiation damper on applications in fire rated ceiling assemblies.
- B. All inside ceiling units shall have factory finish, off-white color unless otherwise noted.
- C. All soffit outdoor units shall have factory finish, color to match soffit. Submit color chart to ARCHITECT for custom color selection.
- D. See Schedule on Drawings for more information.

2.6 PREFABRICATED ROOF CURBS

- A. Roof curbs for concealed applications, where curb is essentially hidden on flat/low slope roof (built up, modified bitumen, etc.) may be galvanized steel construction.
- B. All roof curbs to be provided with continuous welded corner seams and treated wood nailer. Curbs shall be built for pitched roof or ridge mounting as required to

keep top of curb level.

- C. See details on Contract Drawings for more information.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with provisions of Section *BASIC MECHANICAL MATERIALS AND METHODS*, particularly regarding coordination with other trades.
- B. Construct casings, eliminators, and pipe penetrations in accordance with LPDS, Chapter 3. Design casing access doors to swing against air pressure so the pressure helps to maintain a tight seal.
- C. Install duct hangers and supports in accordance with SMACNA, LPDS, Chapter 5, and HPDS, Chapter 6, in concealed applications.
- D. Install life safety dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test. Install multiple access doors to provide access to all damper linkages/fusible links of multiple section life safety dampers.
- E. Seal openings around duct penetrations of fire rated ceilings and partitions with fire stop material as required by NFPA 90A. See Section *Basic Mechanical Materials and Methods*. Provide sound sealant around duct penetrations in wall indicated as sound and/or full height walls.
- F. Provide primary and secondary balance dampers on all supply distribution devices. Provide a supply air duct damper and air extractor off main ductwork to branch ductwork of the types as listed below:
1. Round Ductwork: Provide conical or lateral type taps with integral butterfly damper. Submit information for approval.
 2. Rectangular Ductwork: Provide radius or lateral elbow tap, as indicated with air extractor assembly and opposed blade multi-blade damper.
 3. Provide exterior duct damper and extractor controller arm assemblies that extend past proposed ductwork installation for accessible operation.
- G. When splitter dampers occur above other than lay-in ceiling, provide damper assembly complete with supports, bearings, chromium plated ceiling escutcheons and adjustable regulator, as Young Models No. 1 and No. 890-A.

END OF SECTION

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SECTION 230980 - CONTROLS AND INSTRUMENTATION

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Provide complete HVAC controls and instrumentation for the following items:
 - 1. Air Handling Systems Including:
 - a. Exhaust Fans
 - b. Direct Expansion Systems
 - c. Packaged Heat Recovery Systems (HRU's)
- B. Definitions:
 - 1. Deviations: The difference between the controller set point and the value of the controlled variable (such as room temperature) at any instant.
 - 2. Dead band: A temperature range over which no heating or cooling energy is supplied, such as 72-78 degrees F, i.e., as opposed to single point changeover or overlap.
 - 3. Control Wiring: Includes conduit, wire and wiring devices to install complete HVAC control systems including motor control circuits, interlocks, thermostats, switches and like devices.

1.2 QUALITY ASSURANCE

- A. Criteria:
 - 1. The maximum deviation of occupied room conditions from the controller set point shall not exceed plus or minus one degree F for temperature, and plus or minus three percent for relative humidity unless the system is operating in the dead band range.
- B. Performance tests:
 - 1. Demonstrate to the Owner that all controls are installed, adjusted, and can perform all functions required by the contract drawings and specifications.

1.3 SUBMITTALS

- A. Manufacturer's Literature and Data for all components, including the following:
 - 1. Controllers.
 - 2. Relays and switches.
 - 3. Control dampers, control valves and operators.
 - 4. Instrumentation products.
- B. Certificates:
 - 1. Compliance with paragraph, QUALITY ASSURANCE.
 - 2. Name and address of a permanent service organization maintained or trained by the manufacturer that will render satisfactory service within eight hours after notification that service is required.

- C. Control Drawings: Integrate with flow diagrams; show outlines of HVAC equipment with control devices, schematic one line control piping and wiring, and written sequence of operation and operation instructions. Equipment numbers shall correspond to those shown on the Contract Drawings. Provide three (3) complete sets of blue-line as-built drawings.
- D. Operation and Maintenance Manuals:
 - 1. Submit in accordance with Section *Mechanical Close-Out Requirements*.
 - 2. Include the following documentation:
 - a. General description and specification for all components.
 - b. Detailed illustrations and complete calibration procedures.
 - c. Complete trouble shooting procedures and guidelines.
 - d. Complete operating instructions for all systems.
 - e. Piping schematic/flow diagrams.

1.4 INSTRUCTIONS

- A. Instructions to OWNER Operations Personnel: Perform in accordance with Section *Mechanical Close-Out Requirements*.
- B. Training by independent or franchised dealers who are not direct employees of the temperature control company will not be acceptable.

1.5 GUARANTY

Any defects in workmanship or material during the guaranty period shall be corrected by the CONTRACTOR at no cost to the OWNER. Correction of defects shall be accomplished during regular working hours.

PART 2 – PRODUCTS

2.1 SENSORS AND CONTROLLERS

- A. Combination heating/cooling thermostat: This remote wall sensor/controller is to be utilized to control split and/or packaged HVAC equipment with heating and cooling capabilities. Thermostats shall be of the low voltage or electronic adjustable type and shall conform to requirements of UL 873. Thermostats for air conditioners shall be provided and shall be combination heating-cooling type with contacts hermetically sealed against moisture, corrosion, lint, dust and foreign materials. Thermostats shall be designed to operate on not more than 1.5 degrees Fahrenheit differential from setpoint to actual temperature, or as noted, and of suitable range calibrated in degrees Fahrenheit. Thermostats shall have adjustable heat anticipation and fixed cooling anticipation. Air conditioning heating/cooling thermostats shall contain two independent temperature sending elements electrically connected to control the heating and cooling operation(s), respectively. The electrical characteristics shall be 24V AC or less. The maximum differential between heating and cooling setpoints shall be 3 degrees Fahrenheit. Automatic switching for system changeover from heating to cooling or cooling to heating shall be accomplished through the use of a thermostat sub base. Provide all thermostats with visible temperature space read out in degrees Fahrenheit, and adjustable

separate setpoint control for heating and cooling functions.

Provide the number of stages of control, with a nominal 3 to 5 degrees Fahrenheit between stages, for heating and cooling functions to match the number of stages scheduled and/or specified. Provide a type thermostat with emergency/auxiliary heat control capability matched to heat pump applications.

Provide 7-day programmable time-clock based with simple push button override of unoccupied schedule, where indicated, as Honeywell Model T7300 series.

- B. Humidistat: Low voltage or electronic type sensor/controller capable of minimum 2% relative humidity accuracy, and no more than 1% drift per year temperature compensating, non-condensing, early field calibratable, sensor/controller shall energize humidity control equipment/capability on a rise in space above setpoint. Provide multistage or multiple setpoint humidity sensor/controllers to match equipment scheduled and/or specified capability and/or control.

Space wall mounted humidity sensor/controllers shall be as KELE Series HF/HW-20K-T81 or as approved. Calibration shall be guaranteed for minimum period of two (2) years.

2.2 RELAYS:

- A. Provide as required for system functions.
- B. Electrical Pilot Duty or Contactor Types: Provide inductive rated contacts for circuits with coils, motors or other inductive devices, minimum 120V, 15A. rating.

2.3 MOTORIZED CONTROL DAMPERS

- A. Dampers shall be of the airfoil, ultra low leakage, opposed blade design. Dampers shall be constructed of minimum 16 gauge galvanized steel. Side mounted linkage shall be out of airstream. Blades shall include rubber edge seals for tight seal.
- B. Damper actuators shall be two-position normally closed low-voltage type.
- C. Design and install control dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.

2.4 FINAL CONTROL ELEMENTS AND OPERATORS

- A. Fail Safe Operation: Design and install control valves and dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.
- B. Spring Ranges: As required for system sequencing and to provide tight close off.

2.5 WIRING MATERIALS

- A. Comply with applicable sections of *Division 26 and 28*. Provide wiring for control devices furnished under this Section, HVAC motor control conduits and interlocks. Color code and number all wires, whether individual or in cables, for identification.
- B. A complete wiring system shall be provided for all direct digital control (DDC) and electric controlled apparatus. All wiring shall be installed in a neat, workmanlike manner, of sufficient size and tested to be continuous and without unnecessary "short".

Wiring shall be as follows:

1. Exposed Areas and Mechanical Equipment Rooms: Wiring shall be routed in metallic conduit per *Division 26 and 28* requirements. Provide flexible conduit connections to rotating equipment.
2. Concealed, Accessible Areas: Wiring may be routed outside in above ceiling accessible spaces conduit, however wiring outside conduit shall be sheathed with plenum rated jacket with maximum rating of 50/25 smoke developed/fire rated per NFPA 90A.
 - a. All wiring will be routed in the bar joists and/or roof structure space and supported with tie-straps at maximum 6'-0" on center.
 - b. All drops and risers to HVAC equipment, fans, sensors, etc., will have a tie-strap installed directly above each device to insure a vertical support to the device.
 - c. Any open wiring that enters a conduit in the walls or drop/rise to connect equipment will have a minimum of 12" of wire looped outside the conduit above the ceiling and will be attached utilizing a tie-strap within 12" of the conduit end or connection.
3. Inaccessible Areas: Same as #1 above - includes wiring in walls, above hard ceilings, in chases, etc.
4. Inside Panels or Unit Enclosures: Wiring may be run outside conduit and neatly tied in bundles for neatness and function.
5. Wiring in exterior and moist environments shall be routed in weatherproof liquid tight conduit with matching fittings and connections.
6. Minimum gauge for low voltage (24VAC or less) control wiring shall be 18 AWG copper solid conductor(s).

2.6 TAMPERPROOF INSTALLATIONS

- A. All electric type ceiling and/or duct heater(s), low limit thermostats and high limit humidistat sensor/controllers shall be enclosed in a white tamperproof cover, Kenall "Thermo-Gard", or as approved. Provide OWNER with four (4) tamperproof cover screw tools at completion of project. Mount these devices in a location approved by PROFESSIONAL.
- B. Relays for all HVAC systems, exhaust fans, and ceiling heaters shall be mounted in large junction boxes with covers above accessible ceilings near individual equipment.
- C. Designated room thermostats shall be mounted 48" above finished floor behind clear locking removable cover, as Berko. Provide two (2) keys for each and every cover, to OWNER at end of project.

2.7 IDENTIFICATION/SIGNAGE

- A. Provide permanent phenolic labels for all operators, controllers, and sensors. Coordinate with ENGINEER on designations required. Submit Shop Drawing of installation indicating switch location(s) and identification. See Section *Mechanical Identification*.

B. Provide operating instructions, mounted adjacent to equipment controller, as approved by Professional and TAB commissioner, for the following:

1. Outside air units
2. Heat recovery units

2.8 CONTROL SEQUENCES

Control sequences shall be:

A. SPLIT-DX HEAT SYSTEMS

1. UNIT CONTROLS SHALL BE ENERGIZED FROM THERMOSTAT CONTROLLER LOCATED AS INDICATED ON DRAWINGS.
2. WHEN THE UNIT CONTROLS ARE ENERGIZED, ZONE HEATING AND COOLING THERMOSTAT SHALL CONTROL THE HEATING FUNCTION AND CYCLE CONDENSING UNITS TO MAINTAIN ZONE ENVIRONMENT CONDITIONS.
3. UNITS AS INDICATED BY *DIVISION 26 and 28* WILL INCLUDE AND BE DE ENERGIZED BY SMOKE DETECTOR(S) LOCATED IN THE RETURN AND SUPPLY AIR TRUNK DUCT IF PRODUCTS OF COMBUSTION ARE DETECTED.

B. PACKAGED GAS HEATING/ELECTRIC COOLING SYSTEMS (WITH INTEGRAL HOT GAS REFRIGERANT COIL FOR HUMIDITY CONTROL)

1. UNIT CONTROLS SHALL BE ENERGIZED FROM (THERMOSTAT CONTROLLER LOCATED AS INDICATED ON DRAWINGS.
2. WHEN THE UNIT CONTROLS ARE ENERGIZED, WITH THERMOSTAT FAN "AUTO-ON" SWITCH IS IN "ON" POSITION, EVAPORATOR FAN SHALL RUN CONTINUOUSLY AND ZONE HEATING AND COOLING THERMOSTAT SHALL CONTROL THE HEATING FUNCTION AND CYCLE CONDENSING UNITS TO MAINTAIN ZONE ENVIRONMENT CONDITIONS.
3. UNITS DESIGNATED WILL INCLUDE AND BE DE ENERGIZED BY SMOKE DETECTOR(S) LOCATED IN THE RETURN DUCT/PLENUM AND SUPPLY AIR TRUNK DUCT IF PRODUCTS OF COMBUSTION ARE DETECTED.
4. A ZONE LOCATED HIGH LIMIT HUMIDITY SENSOR/CONTROLLER SET INITIALLY ON 60% RH AND LOW AND HIGH LIMIT THERMOSTAT SETTINGS OF 62 AND 85 DEGREES F. RESPECTIVELY, SHALL AUTOMATICALLY OVERRIDE PROGRAMMABLE THERMOSTAT TIME BASED "NORMAL OCCUPANCY" CONTROL OF ALL ZONE COOLING/HEATING CAPABILITY FOR UNOCCUPIED PERIOD UPPER LIMIT HUMIDITY, MANAGEMENT OF UTILITY USAGE AND/OR FREEZE PREVENTION.
5. DURING UNOCCUPIED PERIODS, SUPPLY FAN SHALL BE CYCLED IN CONJUNCTION WITH A CALL FOR HEATING/COOLING OR DEHUMIDIFICATION.

6. DURING ALL PERIODS, ZONE HUMIDISTAT SHALL ENERGIZE REFRIGERATION CAPACITY AND THERMOSTATIC CONTROLS SHALL CYCLE REFRIGERANT HOT GAS REHEAT AND SEQUENCE GAS VALVE, IN STEPS, AS SECOND STAGE HEATING CAPABILITY, TO MAINTAIN ZONE THERMOSTATIC AND HUMIDITY SETPOINT PER MANUFACTURER'S CONTROLS STRATEGY.
7. PROVIDE INDIVIDUAL EVAPORATOR COIL CIRCUIT FREEZESTAT COMPRESSOR SHUTDOWN AND AUTOMATIC TIME DELAY RESTART CONTROLS ON SYSTEMS SCHEDULED WITH LOW AMBIENT CONTROLS AND ALL UNITS WITH DUAL CIRCUIT EVAPORATORS.
8. WHERE INDICATED ON DRAWINGS, OUTSIDE AIR DAMPER POSITION SHALL BE OVERRIDDEN BY DIFFERENTIAL ENTHALPY ECONOMIZER CONTROLS WHEN OUTSIDE AIR AND RETURN AIR CONDITIONS INDICATE LESS ENERGY IS REQUIRED TO CONDITION OUTSIDE AIR THAN RETURN AIR. OUTSIDE AIR DAMPERS SHALL BE COMPLETELY OPENED PRIOR TO BEGINNING TO MODULATE RETURN AIR DAMPER CLOSED. WHEN CONDITIONS ARE NO LONGER CONDUCIVE TO ECONOMIZER OPERATION, NORMAL SEQUENCE OF OPERATION SHALL RESUME.
9. WHERE INDICATED ON DRAWINGS, UNIT SHALL INCLUDE SUPPLY FAN VFD FOR SINGLE ZONE VAV APPLICATION. THE UNIT SHALL MODULATE THE SUPPLY FAN MOTOR SPEED BETWEEN MINIMUM AND MAXIMUM TOTAL CFM VALUES AS SCHEDULED ON DRAWINGS. UNIT SUPPLY AIR DISCHARGE TEMPERATURE SHALL HAVE A LOW LIMIT SETPOINT OF 50 DEGREES DURING COOLING MODE AND A HIGH LIMIT OF 15 DEGREES ABOVE THE SPACE HEATING SETPOINT DURING THE HEATING MODE. SPECIFIC CONTROL STRATEGY SHALL BE IN ACCORDANCE WITH UNIT MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE TEMPERATURE SWINGS, HEATING STRATIFICATION AND LIMIT INDOOR HUMIDITY LEVELS TO BELOW 60%.

C. FANS:

1. SEE CONTROL SEQUENCE AT SCHEDULE(S) ON DRAWINGS.

D. HEAT RECOVERY UNITS

1. UNIT MANUFACTURER'S CONTROL PANEL SHALL ENERGIZE OUTSIDE AIR UNIT MANUFACTURER'S CONTROLS BASED ON OCCUPANCY SCHEDULE DESCRIBED HEREAFTER. UNIT MANUFACTURER'S CONTROLS SHALL STAGE COOLING/HEATING PER SECTION *PACKAGED HEAT RECOVERY EQUIPMENT*. CONTRACTOR SHALL COORDINATE WITH UNIT MANUFACTURER ON ALL FIELD SUPPLIED/INSTALLED/CONNECTED SPACE AND/OR DUCT SENSORS, CONTROLLERS, ETC. IN ORDER TO ACHIEVE SPECIFIED CONTROL SEQUENCE AND CONSISTENT SPACE ENVIRONMENTAL CONDITIONS.

E. DUCTLESS SPLIT SYSTEMS

1. CONTINUOUS OPERATION. CONTROLLED BY MANUFACTURER'S AUTOMATIC HEATING/COOLING CHANGEOVER THERMOSTATS.

PART 3 – EXECUTION**3.1 INSTALLATION AND ADJUSTMENT**

- A. Install and adjust required control components and systems in accordance with instructions of the manufacturer. Work shall be performed by employees of the manufacturer or an authorized representative.
- B. All control wiring shall be routed in accordance with paragraph 2.05 herein. Install control wiring and connections in accordance with applicable Sections of *DIVISION 26 and 28*.
- C. Except for short apparatus connections run conduit parallel to or at right angles to the building structure. Conceal conduit in finished spaces.
- D. Do not run conduit concealed under insulation or inside ducts. Mount control devices and conduit located on ducts or apparatus with external insulation or stand-off support to avoid interference with insulation.
- E. Run wire connecting devices on or in control cabinets parallel with the sides of the cabinet neatly racked to permit tracing. Rack connections bridging a cabinet door along the hinge side and protect from damage. Provide grommets, sleeves or vinyl tape to protect plastic tubing or wires from sharp edges of panels, conduit, and other items.
- F. Provide all necessary factory and/or field labor for complete calibration and adjustment of the air flow control components, and be responsible for setting all control set points, operating sequences, and alarm systems contained within the control center to produce the system performance specified.
- G. Provide water heater controls, operating instructions, controls and piping schematic in neat laminated displays for mounting in water heater room.
- H. CONTRACTOR shall provide all power wiring and connect relays, time clocks, control panels, MCP, etc. which are furnished by CONTRACTOR.
- I. Provide permanent identification of panel MCP, time clock, and all controllers, by zone, etc. as per Section *Mechanical Identification* and PROFESSIONAL'S instruction. Submit details of proposed identification along with control schematics and device specifications for PROFESSIONAL'S approval. Submit Drawings, schematics, operating instructions, etc. to be posted, framed, laminated, etc. to PROFESSIONAL for approval.

3.2 FIRE ALARM/SMOKE DETECTION COORDINATION

- A. When an existing fire alarm system exists, or a new fire alarm system is being installed as a part of this project (see *DIVISION 26 and 28*), the CONTRACTOR shall provide and install all specified duct and/or plenum mounted smoke detectors as called for by code, specified, and on Mechanical Drawings, etc. and connect devices to fire alarm system.

- B. In general, all smoke detectors shall annunciate to, and be compatible with the fire alarm system. All fire alarm wiring, annunciators, and adaptation to fire alarm system by the CONTRACTOR. All shutdown and controls to automatically de-energize HVAC systems are by the CONTRACTOR.
- C. It is the CONTRACTOR's responsibility to coordinate these responsibilities for safety and operating controls, for complete and operative HVAC systems.
- D. Smoke detectors of proper size and type shall be furnished and properly installed per NFPA and International Electrical and Mechanical codes. The detectors shall be furnished with necessary N.C. and N.O. contacts to accomplish shutdown of HVAC systems.
- E. Each detector shall have a remote alarm and test station installed where directed by ARCHITECT or as shown on Drawings.
- F. See *Division 26 and 28* specifications for other requirements; coordination by this CONTRACTOR.
- G. In general, specified CONTRACTOR above shall furnish and install approved smoke detection and shutdown controls for the following HVAC equipment and accessories:
 - 1. HVAC air handling systems with air delivery capacity 2000 cfm or greater.
 - 2. This includes makeup air, exhaust, heat recovery, ventilation and similar HVAC support and auxiliary systems.
 - 3. All HVAC equipment with smoke detectors shall be additionally connected to the fire alarm system such that the equipment shall automatically be de-energized by any fire alarm annunciation from the same zone as is served by the same HVAC equipment.

END OF SECTION

SECTION 230990 - TESTING, ADJUSTING AND BALANCING

PART 1 – GENERAL

1.1 SCOPE

- A. The process of Testing, Adjusting and Balancing (TAB) for mechanical HVAC and Plumbing systems is a requirement for this project.
- B. Definitions and Abbreviations:
 - 1. TAB: Testing, Adjusting and Balancing. The process of checking and adjusting HVAC and plumbing systems to meet design objectives and performance intent.
 - 2. AABC: Associated Air Balance Council.
 - 3. NEBB: National Environmental Balancing Bureau.
 - 4. Plumbing Systems: Domestic hot water and re-circulating systems.
 - 5. Air Systems: Included all supply air, return air, exhaust air, transfer air and outside air systems.
- C. The CONTRACTOR shall provide the services of a qualified independent TAB Agency for testing, adjusting, and balancing as described herein and include same in his bid. CONTRACTOR shall submit TAB AGENCY experience, agenda and associated credentials to PROFESSIONAL for TAB AGENCY and agenda approval.

1.2 APPLICABLE STANDARDS

- A. TAB Agency Qualifications: Current membership in AABC or NEBB.
- B. Performance Criteria: Work shall be performed in accordance with the approved TAB agenda requirements.
- C. Test Equipment Criteria: The basic instrumentation requirements and accuracy/calibration required by AABC (Section Two) or Section II of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- D. A factory air test hood, recently calibrated, shall be utilized for ceiling air device CFM measurement.

1.3 APPLICABLE PUBLICATIONS:

The following publications form a part of this Specification to the extent indicated by the reference thereto. In text the publications are referred to by the initials of the organization.

- A. Associated Air Balance Council (AABC):
 - 1. National Standards for Total System Balance, 2002 Edition
- B. National Environmental Balancing Bureau (NEBB):
 - 1. Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems, 8th Edition, 2015
 - 2. Procedural Standards for Measuring Sound and Vibration, 2nd Edition, September 2006

1.4 CORRESPONDENCE

- A. Representative of TESTING, ADJUSTING and BALANCING Agency shall report to the CONTRACTOR, during all phases of the test and balance process, any deficiencies that will impair the proper balance and operation of the systems involved. This shall include, but not limited to, reporting balancing valves/dampers, controls, and safety sensors, etc. not installed as called for on the Plans or in the Specifications.
- B. The TAB Agency shall submit preliminary reports a minimum seven (7) days prior to scheduled substantial completion for this project or any phase thereof, and including a comprehensive narrative of problems, obstacles, recommendations, and remedial actions for PROFESSIONAL'S review and approval.
- C. TAB Agency shall not release any reports to other parties until such has been approved by the PROFESSIONAL.

PART 2 PRODUCTS NOT APPLICABLE

PART 3 – EXECUTION

3.1 GENERAL

- A. Coordinate TAB procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing and shall required separate TAB effort and reports for each phase and submittal prior to advancing to next phase of project.
- B. Allow sufficient time in construction schedule for TAB prior to substantial completion inspection for the project.
- C. Conduct final TAB after system has been completed and is in full working order. Put all HVAC systems into full operation and continue operation of the systems during each working day of TAB. Accomplish TAB in accordance with the CONTRACTOR provided Agenda approved by PROFESSIONAL.
- D. Substantial Completion: Substantial Completion of mechanical systems shall not be given without TAB Agency's written certification that the mechanical systems and controls have been thoroughly tested and are safely performing as intended. See certification required herein. No other certification will be acceptable.
- E. Preparation of Equipment and Systems for Testing and Balancing:
 - 1. The CONTRACTOR shall, upon completion of items or work required by this contract, thoroughly clean all dirt and debris from equipment, ducts, piping systems, strainers, accessories, etc. All bearings, gear boxes, wearing surfaces, or other equipment components requiring lubrication shall be properly serviced as recommended by the equipment manufacturer and shall be tagged with the date of service and type of lubricant used. All specified cleaning and protective devices shall then be installed in equipment, piping, plenums, ductwork, etc., and systems shall be placed in continuous operation. All fans shall have been in operation for at least twenty-four (24) hours prior to the start of testing and balancing so that initial

stretch of drive belts will have taken place, and all other mechanical equipment including all temperature and operating control devices will have been adjusted and calibrated for complete and functional operating service.

- F. System balancing and performance testing:
1. The CONTRACTOR shall secure copies of all report forms, data sheets, and instrumentation to be used by the agency in the performance of their services and submit the same for approval. This submittal data shall include a tabulation of instruments and devices to be utilized in the performance of testing and balancing operations and shall include the name of the manufacturer of the instrument of devices, model number, range, degree of accuracy, date of last calibration, or the other pertinent information that may be required to determine the utility of the instrument of device. As a minimum requirement, the following instrumentation shall be employed in the performance of balancing and testing of mechanical system: swinging vane or hot wire type anemometer, low range (0-0.25 in. water column) inclined tube manometer, high range (0-20 in. water column) U-tube manometer, pilot tube, ammeter, volt-meter, self-timing tachometer (maximum scale Division 2 rpm) pyrometer, powered psychrometer, vibration meter, other instruments, tools, and devices as required to accurately balance and test mechanical systems and components.
- G. It is the responsibility of this section to make certain that all the submitted and/or existing equipment has proper motor size, sheave size, belt size, etc.

3.2 AIR BALANCE

- A. Place all interactive systems in operation with all filters installed and automatic control systems completed and operating. Artificially load air filters by partial blanking or other means to provide air pressure drop midway between the clean and dirty condition. Set/reset room thermostats and humidistat, and/or equipment controls as necessary to check heating and cooling functions, and air flow rates for air distribution devices and adjust units if not within specified tolerances.
- B. Balance systems to design ratings. Adjust fan speeds to provide design flows, including system diversities, at actual system pressures. Belt drives, including sheaves, belts, etc. shall be adjusted and/or replaced as required to safely obtain specified performance.
- C. Make pitot tube traverses of all trunk lines and major branches when required to determine proper proportioning of air flows. Airflow measuring devices, where installed, may be utilized for this purpose. Seal duct access holes with snap in plugs.
- D. Record pressure drop readings across all major system components and significant drops within duct systems such as air filters, coils, heaters, etc.
- E. Make flow and pressure measurements at each terminal device, and each supply, return, or exhaust diffuser. Adjust each air outlet unit within plus or minus 10 percent of design requirements, but total air for each system shall be not less than shown unless otherwise approved by PROFESSIONAL. Adjust grilles and diffusers to minimize drafts in all areas. Mark permanently all damper quadrants at final set points. Total differentials between ventilation and exhaust for the purpose of proper

pressurization, shall be maintained.

F. Adjust exhaust systems to indicated CFM requirements (+/- 10%).

3.3 VIBRATION TESTING

Check for excessive vibration of rotating equipment.

3.4 SOUND TESTING

Check for excessive noise from equipment, air distribution devices, etc. and notify PROFESSIONAL of any objectionable noise levels. Perform noise/sound measurement and provide noise level calculations/results in rooms and areas requested by PROFESSIONAL.

3.5 DUCT LEAKAGE TESTS

See Section *Ductwork* for duct testing requirements.

3.6 BUILDING/ZONE PRESSURIZATION:

The Tab Agency shall test the building pressurization and report same to PROFESSIONAL. These tests shall include various simulations between maximum and minimum ventilation capacities, to assure proper relief capability and pressurization per current ASHRAE recommendations.

3.7 MINIMUM TAB DATA REQUIRED

Approved TAB Agency shall furnish all labor and materials to balance the following new and/or modified equipment and systems: The following minimum information shall be provided:

- A. Roof Top Units: on systems scheduled to have multiple stages of heating and/or cooling capacity, or CFM requirements, provide the information for temperatures and/or airflow to indicate same for each operating condition. All information/data shall be gathered within a 90 minute period.
1. Total S/A CFM –
 2. R/A CFM –
 3. O/A CFM (Min/Max) –
 4. R/A E.A.T. - Db/Wb (Cooling) –
 5. O/A E.A.T. - Db/Wb (Cooling) –
 6. S/A L.A.T. - Db/Wb - (first stage cooling only)
 7. S/A L.A.T. - Db/Wb - (first & second stages cooling together)
 8. R/A E.A.T. - (Heating) –
 9. O/A E.A.T. (Heating) –
 10. S/A L.A.T. - (first stage heating only) –
 11. S/A L.A.T. - (first and second stages heating together) –
 12. External Static Pressure
 13. Fan RPM

14. Fan Motor F.L.A. rated vs. actual
 15. Fan Motor Horsepower and Service Factor (belt drive units)
 16. Size, Type, Efficiency and Relative Condition of all Air Filters
- B. DX Split System Air Handler: on systems scheduled to have multiple stages of heating and/or cooling capacity, or CFM requirements, provide the information for temperatures and/or airflow to indicate same for each operating condition (single and multi-stage).
1. Total S/A CFM –
 2. R/A CFM –
 3. O/A CFM –
 4. R/A E.A.T. Db/Wb (Cooling) –
 5. O/A E.A.T. Db/Wb (Cooling) –
 6. S/A L.A.T. Db/Wb (Cooling) –
 7. R/A E.A.T. Db/Wb (Heating) –
 8. O/A E.A.T. Db/Wb (Heating) –
 9. S/A L.A.T. Db/Wb (Heating) –
 10. Fan Motor Voltage –
 11. Motor Horsepower –
 12. Fan Motor Amperage at 100% Capacity –
 13. External Static Pressure –
 14. Size, Type, Efficiency and Relative Condition of all Air Filters –
- C. Condensing Units:
1. E.A.T. –
 2. L.A.T. –
 3. Voltage –
 4. F.L.A. –
 5. Outdoor ambient (°F) –
- D. Fans:
1. CFM –
 2. Voltage –
 3. F.L.A. –
 4. External Static Pressure –
- E. Heat Recovery Units: All information/data shall be gathered within a 90 minute period. TAB Agency shall coordinate with CONTRACTOR and unit manufacturer's representative to be present on day(s) of testing these systems.

1. Supply/O/A
 - a. CFM - (one (1) reading with bypass closed and one (1) reading with bypass open)
 - b. Enthalpy Wheel E.A.T. Db/Wb –
 - c. Enthalpy Wheel L.A.T. Db/Wb –
 - d. Cooling Coil L.A.T. Db/Wb (Cooling) - (first stage only) –
 - e. Cooling Coil L.A.T. Db/Wb (Cooling) - (first and second stages together) –
 - f. Unit L.A.T. Db/Wb (Heating) - (1st (Enthalpy Wheel) & 2nd gas furnace) stages together) –
 - g. External Static Pressure –
 - h. Fan RPM –
 - i. Fan Motor F.L.A. - rated vs. actual –
 - j. Fan Motor Horsepower and Service Factor –
 - k. Size, Type, Efficiency and Relative Condition of all Air Filters –
2. Return/Exhaust
 - a. CFM
 - b. Enthalpy Wheel E.A.T. Db/Wb –
 - c. Enthalpy Wheel L.A.T. Db/Wb –
 - d. External Static Pressure –
 - e. Fan RPM –
 - f. Fan Motor F.L.A. - rated vs. actual –
 - g. Fan Motor Horsepower and Service Factor –
 - h. Size, Type, Efficiency and Relative Condition of all Air Filters –
- F. Packaged Terminal Air Conditioning Units (PTAC):
 1. Total S/A CFM –
 2. R/A CFM –
 3. O/A CFM –
 4. R/A E.A.T. - Db/Wb (Cooling) –
 5. O/A E.A.T. - Db/Wb (Cooling) –
 6. S/A L.A.T. - Db/Wb - (Cooling)
 7. R/A E.A.T. - (Heating) –
 8. O/A E.A.T. (Heating) –
 9. S/A L.A.T. - (Heating) –

10. External Static Pressure
 11. Fan RPM
 12. Fan Motor F.L.A. rated vs. actual
 13. Fan Motor Horsepower and Service Factor (belt drive units)
 14. Size, Type, Efficiency and Relative Condition of all Air Filters
- G. Balance all S.A., E.A. and O.A. air distribution devices to within 10% of specified C.F.M., yet main area pressurization and differentials.
- H. Mark all flow C.F.M., balance valve set points, etc. on an 11"x17" reduced scale set of working drawings and submit to PROFESSIONAL with TAB report prior to completion of work.
- I. Submit list of equipment with excessive vibration.
- J. Submit the Test and Balance report as indicated above, along with the working drawing to PROFESSIONAL for approval prior to completion and substantial completion inspection to job.
- K. Verify that all mechanical system controls, safety and shutdown interlock and sequence of operation is as specified. TAB Agency shall provide written certification that he has verified same and/or note any and all discrepancies. See paragraph 3.11 for specific certification.

3.8 TAB SITE VISIT COORDINATION

- A. The TAB Agency shall inform the PROFESSIONAL, in writing seven (7) calendar days prior to his site visit for final TAB of systems such that PROFESSIONAL may be present to witness same, at PROFESSIONAL'S sole discretion. Changes to schedule shall be coordinated with and approved by PROFESSIONAL, with sufficient advance notice. TAB Agency shall be required to coordinate with PROFESSIONAL'S office representative, date of final inspection, and provide random tests and verification of TAB report information, at PROFESSIONAL'S selection.
- B. It shall also be the responsibility of the TAB agency to include the cost of any opposite season check-out of all system components which might be required and modify air distribution delivery and/or temperature to any room, area, or zone which may require adjustment during the first year of system operation.

3.9 SYSTEM CHANGES

- A. Final balancing changes shall be approved by the CONTRACTOR'S who installed the equipment. Changes may encompass, but not be restricted to, changing the pulleys, belts, dampers or adding dampers, balancing valves, etc.
- B. The TAB Agency shall coordinate with the CONTRACTOR any changes required including belts, sheaves, etc. to balance systems within specified tolerances. All cost of any modifications is the responsibility of the CONTRACTOR.

3.10 VERIFICATION / INSPECTION

- A. After the final TAB report is submitted and reviewed by the PROFESSIONAL, he will soon afterward schedule a verification inspection with the TAB Agency. At this

inspection, the TAB Agency will test airflow flows, water flows, sound levels, control operation and sequence, for random air distribution grilles, fans, AHU's, equipment, piping, etc., as selected by PROFESSIONAL.

- B. This inspection will last no longer than four (4) hours for each completed phase of the project. Should this verification information exceed the specified tolerance, the TAB Agency may be required to retest and balance the entire system(s) to these tolerances, solely at the PROFESSIONAL's discretion. A follow-up verification inspection shall then be required, and the procedure will begin again. The cost of these inspections, re-inspections, TAB and reports shall be borne by the CONTRACTOR.

3.11 CERTIFICATION

The TAB Agency shall provide the following written TAB certification within the final TAB report (see also Section *Mechanical Submittals and Shop Drawings*):

“The Testing, Adjusting and Balancing (TAB) Agency certifies that the HVAC air and plumbing water systems and controls have had a full range of tests and checks carried out by the TAB Agency, to determine if all components, sub-systems, systems and interfaces between systems operate in accordance with the Contract Documents. This includes all modes and sequences of control operation, interlocks and conditional and specified control responses to abnormal, safety and emergency conditions. The (TAB) Agency had provided to the OWNER the specified training and documentation on the operation of these systems such that these systems can be safely and efficiently operated in line with design requirements.”

3.12 OWNER EDUCATION REQUIREMENTS AND INVOLVEMENT

See Section *Mechanical Close-out Requirements* for Owner Education requirements.

END OF SECTION

DIVISION 26
ELECTRICAL

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SECTION 260511 - ELECTRICAL GENERAL AND WORK IN EXISTING FACILITIES**PART 1 – GENERAL**

1.1 GENERAL

- A. All work shall conform to the latest editions of the National Electrical Code (NEC) [National Fire Protection Association (NFPA) 70], the Standard for Electrical Safety in the Workplace (NFPA 70E), the Life-Safety Code (NFPA 101), the International Building Code, the Americans with Disabilities Act, and all other applicable federal, state, and local codes and regulations.
- B. All work shall be performed in strict compliance with NFPA 70E. Submission of bid shall stand as an agreement by the Contractor to indemnify and hold harmless the Engineer and Owner from all liability related to damage and/or injury to personnel and equipment during the installation of the project.
- C. The contract documents are schematic in nature and are intended to convey the intent of the electrical work to be performed on this project. Provide all material, labor, equipment, etc., necessary to provide complete and operable electrical systems.
- D. The General Conditions, Supplementary Conditions, General Requirements, Information to Bidders, and all other parts of this set of Contract Documents are hereby adopted and are applicable to the Division 26, 27, and 28 Contractor.

1.2 SCOPE OF WORK

- A. Visit site prior to bid. Devise a plan for installation of complete and operable electrical systems meeting the requirements and intent of the Contract Documents. Submission of Bid stands as evidence that the Contractor accepts the Contract Documents as sufficient and complete for the work to be performed. Notify the engineer at least two weeks prior to bid of any discrepancies between the Contract Documents and actual field conditions. No change orders will be granted due to existing conditions that could have been observed during a site visit.
- B. Provide temporary power and lighting during construction. Coordinate with the General Contractor for the exact requirements.
- C. Electrical switchgear and panelboard layouts are based on sizes of Square D equipment. Equipment manufactured by General Electric, Siemens, and Cutler Hammer are equally acceptable. However, the Electrical Contractor is responsible for selecting and furnishing gear that will fit in the spaces provided and shall be responsible for arranging the gear to meet the required code clearances. Regardless of the manufacturer, the Electrical Contractor shall provide a drawn-to-scale electrical layout with the equipment brochures for all rooms in which panelboards, motor control centers, switchboards, or switchgear are placed. The drawings shall include the work of all other trades including mechanical system piping, ductwork, sprinkler piping, etc. No conduits shall be installed until layouts have been approved.
- D. Locate junction boxes, pull boxes, disconnects, and other equipment requiring access in such a manner that they are accessible at the end of construction. Notify the Architect where it is impossible to plan conduit routing or equipment placement in such a manner, and provide the necessary access panels in the ceiling or wall as required. The access panel type and style shall be subject to the Architect's approval. Employ a painter to provide the appropriate coatings as directed by the Architect.

- E. Relocate, or recircuit, all electrical equipment, conduit, and circuitry conflicting with or obstructing work on this project. Where the electrical systems are owned by other entities, pay them to relocate, or recircuit, their facilities.
- F. Arrange for connection of service to all electrical systems by the appropriate utility company. Coordinate completely with all utility company requirements even if they are different than the contract documents. If utility company requirements are different from the contract documents, notify the engineer at least ten days prior to bid. Pay all utility company charges necessary for installation and connection of service. **No change orders will be granted for utility company connection fees.**
- G. Provide all necessary equipment, raceway, circuitry, fittings, lugs, terminations, labor, etc. and connect to all equipment and appliances requiring electrical connections furnished herein, by the Owner, or by other Contractors. Prior to ordering electrical equipment and roughing in for equipment furnished by the Owner or other Contractors, verify all connection types, connection locations, connection heights, voltages, number of phases, conductor sizes, disconnecting means, breaker sizes, etc. Furnish the proper electrical equipment for the equipment actually being supplied.

1.3 WORK IN EXISTING FACILITIES

- A. All work shall be scheduled and coordinated through the General Contractor with the Owner. Provide necessary costs for all work during both normal and premium work hours in bid.
- B. Provide continuous uninterrupted power to all existing facilities to remain during the entire construction process. Any required power outages must be scheduled and approved by the Owner in writing at least three days prior to the outage.

1.4 SCOPE OF WORK IN EXISTING FACILITIES

- A. Prior to beginning work, survey existing electrical systems. Document, in writing, signed by the Owner any portions of existing systems that are not operating properly before construction begins. Any electrical systems found inoperable at the end of the construction process that has not been so documented shall be repaired at the end of construction.
- B. Remove electrical equipment in areas being demolished and electrical equipment feeding other equipment being demolished. Remove raceways and circuitry back to the panel of origination. Where raceways are installed in inaccessible areas, remove conductors back to the panel of origination. Where circuits are not being completely demolished, remove conductors back to a junction box or other connection point outside of the renovated area and recircuit existing electrical equipment that is to remain as required. Where necessary, completely refeed existing electrical equipment that is to remain. It is the intent of this specification that all existing equipment to remain be left completely operable at the end of the construction process.
- C. Survey existing panel board circuitry and provide new typewritten directories giving complete as-built circuitry information for all panel boards affected by the construction on this project.
- D. Where new circuit breakers are installed in existing equipment, the new circuit breakers shall be manufactured for installation in that equipment. The Amperes Interrupting Current (AIC) Rating shall equal the AIC rating of the existing equipment. A breaker with a lower AIC rating may be used if the contractor provides calculations showing that the breaker rating is sufficient to

handle the available fault current. Submit these calculations for approval prior to ordering the breaker. An AIC rating on an existing breaker in the panelboard or switchboard does not demonstrate sufficient proof that the available fault current is less than that breaker's AIC rating.

1.5 SUBMITTALS AND SHOP DRAWINGS

- A. Within 30 days after award of Contract and prior to beginning work, provide six bound copies of manufacturers' cut sheets containing information concerning each article of electrical equipment to be furnished on this project. These cut sheets shall contain sufficient information to prove compliance with the contract documents. Information addressing the requirements of the contract documents shall be highlighted. Each bound set shall bear the stamp of the Electrical Contractor as well as the General Contractor.
- B. Within 30 days after award of Contract and prior to beginning work, provide six sets of full size shop drawings showing exact equipment locations with all equipment drawn to scale. Show all raceways with their junction boxes and pull boxes. Show all connection types, locations, and heights to equipment. Provide mounting and support details for all raceways and equipment. Coordinate with all other trades to ensure that there are no conflicts between systems. Each set of shop drawings shall bear the stamp of the Electrical Contractor, the General Contractor, and all Project Sub-Contractors. Failure to submit these Shop Drawings will render the Electrical Contractor responsible for resolving all conflicts between trades at his own expense.
- C. Submittals and Shop Drawings are reviewed to determine quality of materials. Approval of submittals and shop drawings does not relieve the Contractor of meeting the requirements and intent of the Contract Documents.
- D. Outlet, light fixture, and device locations are shown in their approximate locations on the drawings. Coordinate with Architectural drawings to get final locations. Mount all electrical outlets shown at counters such that the bottom of the box is two inches above the backsplash or six inches above a counter with no backsplash. The Owner reserves the right to relocate outlets, light fixtures, and devices a distance not to exceed twenty feet prior to the installation of outlet boxes.

PART 2 - PRODUCTS

- 2.1 All electrical equipment and materials shall be new. All equipment and materials shall be stored on the job site in weatherproof enclosures. Electronic equipment shall be stored in facilities where the temperature and humidity are controlled. In addition, comply completely with all manufacturers' requirements for storage and handling.
- 2.2 All equipment shall be UL listed for the application in which it is used and shall be labeled as evidence of its UL listing.
- 2.3 Each circuit breaker supplying a multiwire branch circuit shall be installed with a manufacturer supplied handle tie to simultaneously disconnect all ungrounded conductors. Each multi-wire branch circuit shall comply with NEC article 210.4.
- 2.4 Products shall be selected to maintain or improve the aesthetics of the facility. Gain approval of the Architect or Engineer prior to ordering or installing any electrical equipment or raceway.

PART 3 – EXECUTION**3.1 WORKMANSHIP**

All work shall be performed with an emphasis on neatness. The Engineer, Architect, and Owner retain the right to reject work that is, in their judgment, unsatisfactory.

3.2 EXPERIENCE

The Contractor shall have completed at least two jobs of similar size and scope within the past five years. The Engineer reserves the right to reject Contractors based on their inability to submit evidence of their experience, or based on experience with the Contractor on previous projects.

3.3 PERMITS

Obtain and pay for all permits required for work.

3.4 FIREPROOFING

- A. Fireproof all penetrations through firewalls with a fireproofing compound listed to maintain the rating of the wall through which the raceway passes.
- B. The fire-stopping caulk shall be a one-part, intumescent, latex elastomer. The caulk shall be capable of expanding a minimum of 3 times at 1000°F. The material shall be thixotropic and be applicable to overhead, vertical and horizontal fire-stops. The caulk shall be listed by independent test agencies such as UL or FM and be tested to, and pass the criteria of, ASTM E 814 Fire Test, tested under positive pressure. It shall comply with the requirements of the NEC (NFPA-70), BOCA, ICBO, SBCCI and NFPA Code 101. Fire-stopping caulk shall be paintable, but shall be non-hardening. Fire-stopping caulk shall be 3M Fire barrier CP or approved equal.
- C. The fireproofing materials shall be installed by individuals certified to perform such work. Submit evidence of personnel certifications with electrical equipment brochures.
- D. Where cable trays are shown crossing firewalls, terminate the cable tray on each side of the wall and run the conductors through conduits installed in the wall. Fireproof around the conductors after installation.
- E. Provide mineral wool packing and all other materials recommended by the manufacturer for a complete installation.

3.5 FLASHING

Provide all necessary equipment and flash all roof penetrations in such a manner to ensure that all penetrations are completely sealed and all roof warranties remain in effect. Where there are no roof warranties, the Electrical Contractor shall guarantee the electrical penetrations against leaking for a period of one year from project completion. Employ a professional roofing contractor to perform all flashing.

3.6 PROTECTION

- A. Keep energized equipment covered during all phases of construction. Use enclosures, doors, covers, etc., to ensure that neither personnel nor machinery contact live electrical equipment.
- B. Replace electrical equipment that is damaged during construction.

3.7 DAMAGED FACILITIES

- A. Locate all existing site equipment and utilities prior to beginning construction. Repair all equipment and utilities damaged during construction, or pay for the repair of the equipment and utilities where required by the Owner of the damaged facilities.
- B. Coordinate the routing of all circuits and the locations of all devices with the Architect or Engineer and the Owner. Shop drawings shall describe completely the locations and elevations of all raceways, boxes, fittings, and equipment.

3.8 EXCAVATION AND BACKFILL

- A. Excavate in such a manner as to minimize erosion of the soil. Backfill trenches around conduits with fine sand that is free of rocks, clods, and debris. Fill sand a minimum of 4" over conduits. Backfill the rest of the trench in six inch increments, wetted, and tamped. Final compaction shall be a minimum of 95% of that of the adjacent earth. Resurface the grade with the same material as that excavated from the grade whether it be paving, concrete, sod, etc. Repair work shall be comparable to the quality of the original site prior to excavation.
- B. Provide a 3" wide plastic labeled marker tape 12" below grade over all electrical conduits buried underground. Tapes for power circuits shall have a warning such as "Caution: Buried Electrical Line Below." Labels on tapes for telephone, data, cable television, and other facilities shall adequately describe the line over which they are buried.
- C. Provide a #12 AWG wire in each buried conduit run labeled accordingly on each end.

3.9 IDENTIFICATION

- A. Label all switchboards, panel boards, motor starters, disconnects, and motor control centers furnished under Division 26, 27, and 28 and other divisions of this contract with engraved rigid plastic nameplates having letters at least ¼ inch high. Nameplates shall be bolted to the enclosure. All labels shall indicate the voltage, number of phases, the AIC rating, and the panelboard and circuit number from which the device is fed.
- B. All circuit breakers in Switchboards, Motor Control Centers, Square D I-Line, and similar panel boards shall be labeled with plastic nameplates (as described in Part A) providing the name of the load served and the ampacity and number of poles of the breaker.
- C. All Square D NQOD, NF and similar panel boards shall have typewritten circuit directories.
- D. Label all conductors at all junction boxes, pull boxes, and terminations with typewritten adhesive markers indicating the panel board or switchboard name and circuit number of the conductor. Labels shall be Brady Datab or approved equal.
- E. Label all junction boxes and pull boxes with stenciled painted letters containing the name of the panel board and circuit numbers of the circuits contained within. Use black paint for normal

circuits, red paint for emergency circuits, and orange paint for fire alarm circuits. The Contractor may select other colors for junction boxes and pull boxes for auxiliary systems.

- F. Label all conduits in the most likely direction of access and view every 50' and on both ends of each bend with stenciled painted letters containing the name of the panel board and circuit numbers of the circuits contained within. Use black paint for normal circuits, red paint for emergency circuits, and orange paint for fire alarm circuits. The Contractor may select other colors for conduits for auxiliary systems.

3.10 AS-BUILT DRAWINGS

Maintain one set of drawings during construction for as-built markings. Mark these drawings in red to indicate field changes. Provide these drawings to the Engineer at the end of the construction process. Where required under the General Conditions, Special Conditions, or other portions of this contract, provide revised computer drawn as-built drawings to the Engineer at the end of construction.

3.11 TESTING

- A. Test all systems, or pay testing agencies as required, for compliance with the requirements of all regulatory agencies.
- B. Test the electrical power service ground using a Biddle Three-Terminal Ground Resistance Tester, or approved equal. Grounds shall meet the requirements of the NEC, or of Specification 26 05 26, whichever is more stringent. Test grounds only when the earth is dry. Provide additional ground rods as necessary to achieve the required results.
- C. Prior to making final equipment connections, test all service, feeder, and branch circuit conductors for continuity, phase-to-phase faults, and phase-to-ground faults using a Megger BM100 or approved equal test instrument generating 500 Vdc. Insulation resistance shall be a minimum of 500,000 Ohms between any conductor and ground and 1,000,000 Ohms between any two conductors.
- D. Test other systems as required in their respective specifications.
- E. Provide three bound copies of all test results to the Engineer at the end of the construction process. No Recommendation of Substantial Completion will be granted until all testing reports have been submitted.

3.12 WARRANTY

Provide the Owner a written guarantee to repair, or replace, all faulty equipment and systems for a period of one year from date of Substantial Completion. During this one-year period, a representative of the Contractor shall be on the site actively working on the repairs within 24 hours of the Owner's telephone call. During this period of time, the Owner shall not be charged for any repair work or expenses related with the repair work unless the Contractor can prove that the Owner has damaged the equipment or system.

END OF SECTION 260511

SECTION 260520 – LOW-VOLTAGE POWER CONDUCTORS AND CABLES**PART 1 – GENERAL**

- 1.1 Provide all circuitry, terminations, splices, connectors, lugs, and other equipment necessary for connection of all equipment requiring electrical connections.
- 1.2 METAL CLAD CABLE.
- A. Provide all circuitry, terminations, splices, connectors, lugs, and other equipment necessary for connection of metal clad cable where used on this project.
 - B. Metal Clad (MC) Cable may only be used where new electrical devices are being installed in existing hollow walls. All other circuitry shall be in conduit per Specification 26 05 33.
 - C. Provide a junction box in the accessible ceiling above the location of the new outlet. Provide a hole in the wall above the accessible ceiling. At the proper outlet height, cut out a hole in the wall for the use of an after-construction box. Run MC Cable down the wall to the junction box in the crawlspace, and connect it to the after-construction box before installing the box in the wall.
 - D. Each MC cable shall be furnished with a green insulated copper ground wire that is not shown by tic marks on the drawings.

PART 2 – PRODUCTS**2.1 CONDUCTORS**

- A. All electrical conductors shall be soft-drawn annealed copper having 98% conductivity and an insulation rating of 600V.
- B. Conductors shall be UL listed for installation in the raceway in which they are to be installed.
- C. Conductors shall be rated 90 degrees C for use in residential, commercial, industrial, and institutional facilities, and shall be listed as 105 degrees C appliance wire. Conductors shall be listed under UL 83, UL 1063, and UL 758. If XLP or EPR insulation is used, conductors shall be listed under UL 44 and NEMA WC7.
- D. Conductors used for branch circuits, feeders, auxiliary systems, and controls run in dry locations shall have PVC insulation and a Nylon outer jacket. They shall be THHN/THWN or XHHW-2.
- E. Conductors used for branch circuits, feeders, auxiliary systems, and controls run in wet locations shall have XLP or EPR insulation and be type XHHW-2.
- F. Conductors used for operating room isolation panels and associated branch circuits shall be copper stranded conductor having a cross-linked polyethylene insulation or equivalent with a dielectric constant of 3.5 or less. Wire-pulling compounds that increase the dielectric constant shall not be used on the secondary conductors of isolation panels. The isolated circuit conductors shall be identified as follows:

Isolated Circuit #1 – Orange

Isolated Circuit #2 – Brown

For 125 volt, 15 & 20 ampere receptacles: The orange conductor shall be connected to the terminal on the receptacle that is identified in accordance with NEC 200.10(B) for connection to the grounded circuit conductor.

- G. Conductors used for services shall be type SE for aerial services or type USE-2 for underground services.
- H. Sizes #10 and #12 shall be solid conductors except where used for controls. All controls conductors shall be stranded.
- I. Use minimum #14 AWG conductors for controls and auxiliary circuits. Use larger conductors as required to compensate for voltage drops exceeding 3% of the system voltage.
- J. Conductors shall be furnished in the colors described below unless local ordinances require different colors. Conductors #8 and smaller shall be furnished with colored insulation; conductors larger than #8 shall be taped with the appropriately colored tape for a length of at least 2" at each panelboard, junction box, pull box, load, or other exposed location. Ground conductors shall be taped green for their entire exposed length.

System Voltage	208Y/120V, 3-Phase, 4-Wire	120/240V, 3-Phase, 4-Wire	480Y/277V, 3-Phase, 4-Wire
Phase A	Black	Black	Brown
Phase B	Red	Orange	Orange
Phase C	Blue	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green

2.1 METAL CLAD CABLE

- A. Shall be UL listed as type MC. It shall meet the requirements of UL 1569. It shall also be constructed in accordance with NEC 334 C.
- B. Fittings shall be manufactured and UL listed for the application in which they are used.
- C. MC cable shall have an interlocked armor made of aluminum alloy or galvanized steel.
- D. All electrical conductors shall be soft-drawn annealed copper having 98% conductivity and an insulation rating of 600V.
- E. Conductors shall have PVC insulation and a Nylon outer jacket. They shall be THHN/THWN or XHHW-2.
- F. Sizes #10 and #12 shall be solid conductors. Other conductors shall be stranded.
- G. Conductors shall be furnished in the colors described below unless local ordinances require different colors. Conductors #8 and smaller shall be furnished with colored insulation; conductors larger than #8 shall be taped with the appropriately colored tape for a length of at least 2" at each panelboard, junction box, pull box, load, or other exposed location. Ground conductors shall be taped green for their entire exposed length.

SystemVoltage	208Y/120V, 3-Phase, 4-Wire	3-	120/240V, 3-Phase, 4-Wire	480Y/277V, 3-Phase, 4-Wire
Phase A	Black		Black	Brown
Phase B	Red		Orange	Orange
Phase C	Blue		Blue	Yellow
Neutral	White		White	White
Ground	Green		Green	Green

PART 3 – EXECUTION

3.1 CONDUCTORS

- A. Install conductors carefully using a minimum of two tradesmen – one feeding the conductors into the conduit, and the other pulling the conductors into the conduit.
- B. **Each branch circuit and multiwire branch circuit shall be run with its own neutral conductor complying with NEC article 200.4.**
- C. Join stranded conductors with appropriate mechanical or compression lugs. Wire nuts may be used for solid conductors only.
- D. Splices shall only be made in approved enclosures. Splices shall not be pulled inside conduits.
- E. Provide cable supports and strain relief connectors as required by the NEC.
- F. Furnish junction boxes, pull boxes, handholes, manholes, etc. as required to ensure that the maximum number of bends allowed by the NEC are not exceeded and to ensure that the cables are not damaged during installation.

3.2 METAL CLAD CABLE EXECUTION

- A. Install MC Cable per the requirements of NEC 334 B.
- B. Join stranded conductors with appropriate mechanical or compression lugs. Wire nuts may be used for solid conductors only.
- C. Provide cable supports as required by the NEC.
- D. Furnish junction boxes, pull boxes, handholes, manholes, etc. as required to ensure that the maximum number of bends allowed by the NEC are not exceeded and to ensure that the cables are not damaged during installation. Do not enclose junction boxes in areas that will be inaccessible at the end of construction.
- E. MC Cable shall be run complete between junction boxes or outlet boxes. Splices are not allowed.

END OF SECTION 260520

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SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**PART 1 – GENERAL**

1.1 GENERAL

Ground all equipment, systems, structures, etc., per the latest edition of the National Electrical Code (NEC).

PART 2 – PRODUCTS

- 2.1 Use mechanical bolted connections in dry locations that are accessible.
- 2.2 Use exothermic welds in wet locations and locations that will be inaccessible at the end of construction.
- 2.3 Ground rods shall be UL listed 3/4" x 10' copper-clad steel ground rods with a minimum copper cladding thickness of 10 mils.

PART 3 – EXECUTION

- 3.1 Ground rods shall be installed with their tops no less than 6" below grade.
- 3.2 Bond ground connections to metal raceways at each end of the conduit run. Provide grounding bushings where required by the NEC. Where cable trays are used, bond the ground conductor to each section and fitting of the tray.
- 3.3 Provide all circuits with an equipment grounding conductor sized per the NEC, or as shown on the drawings. Circuitry shown on drawings does not include the required equipment grounding conductor. Where multiple circuits are run with a common neutral, only one equipment grounding conductor is needed. The equipment grounding conductor shall be furnished with green insulation for conductors #8 AWG and smaller; where larger than #8, the equipment grounding conductor shall be taped green for its entire exposed length.
- 3.4 The grounding electrode conductor(s) shall be bare or shall be colored green for its entire exposed length.
- 3.5 Individual ground conductors shall be installed in PVC conduit sized per the NEC.
- 3.6 Provide receptacles, luminaires, and other devices with a green conductor that bonds the receptacle grounding screw or pigtail, the outlet box grounding screw, and the equipment grounding conductor together.
- 3.7 In health care facilities, where two or more different panel boards serve the same patient-care area, an 8 AWG insulated continuous copper conductor shall bond these different panel boards together.
- 3.8 Telephone, cable television, and other auxiliary systems shall be bonded to the electrical building service ground using a conductor no smaller than #6 AWG.

END OF SECTION 260526

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SECTION 260533 – RACEWAYS, OUTLET BOXES AND JUNCTION BOXES FOR ELECTRICAL SYSTEMS**PART 1 – GENERAL**

1.1 GENERAL

- A. All electrical systems circuitry shall be contained in raceways unless expressly listed in the specification for that system.
- B. Outlet Boxes and Junction Boxes
1. Furnish and install all outlet boxes and junction boxes in accordance with this specification and the requirements of the NEC.
 2. Provide outlet boxes for all switches, receptacles, luminaires, telephone jacks, cable jacks, and other devices furnished in this Contract. Provide all necessary hardware including, but not limited to, additional structural support, support brackets, screws, bolts, fixture studs, etc.
 3. Outlet boxes and junction boxes in dry locations shall be galvanized stamped steel boxes sized per the latest edition of the National Electrical Code (NEC), but no less than 4" x 4" x 2 1/8" deep. The thickness of the steel shall be in compliance with the requirements of the NEC. Provide stamped steel covers for all junction boxes manufactured to fit the particular box on which it is used.
 4. Outlet boxes used in concrete and masonry walls and ceilings shall be of the concrete type manufactured for such applications.
 5. Outlet boxes and junction boxes in wet locations shall be of cast metal construction with gasketed waterproof covers. All conduit connections to the boxes shall be made watertight.
 6. Wall outlet boxes shall be 4" x 4" x 2 1/8", or larger as required, with plaster rings provided for final flush installation. Plaster rings shall have single-gang openings unless the equipment mounted inside requires two-gang installation.
 7. Floor boxes in slabs on grade shall be deep rectangular, cast iron, fully adjustable boxes with brass rings. Covers shall be made of brass and shall provide flip top access to the power or data jacks inside. Screw-on covers are not acceptable unless a flip-top cover is unavailable for the device installed in the floor box. Provide the box sized as required for the number of devices shown installed. Boxes shall be as follows, or approved equal:
 - a. Single-Gang Boxes: Hubbell B2436
 - b. Single-Gang Cover Plates: Hubbell S3825
 - c. Double-Gang Boxes: Hubbell B4233
 - d. Double-Gang Cover Plates: Two Hubbell S3825 Cover Plates
 - e. Triple-Gang Boxes: Hubbell B4333
 - f. Triple-Gang Cover Plates: Three Hubbell S3825 Cover Plates
 8. In slabs above grade, use cast iron, semi-adjustable shallow boxes as follows, or approved equal:
 - a. Single-Gang Boxes: Hubbell B2414
 - b. Two-Gang Boxes: Hubbell B4214

- c. Three-Gang Boxes: Hubbell B4314
- 9. Receptacles installed in floor boxes shall be as described in Specification 26 09 23, Switches and Receptacles. Data, Telephone, or Combination Data and Telephone Outlets shall consist of Category 5 rated RJ45 jacks mounted in a Hubbell DJOI strap for use under a S3825 flip top cover plate.
- 10. In existing slabs above grade, use poke thru boxes as follows, or equal:
 - a. Hubbell System One
- 11. Size all boxes per the requirements of the latest NEC.

1.2 SCOPE OF WORK

A. Raceways

1. Provide all raceways, fittings, couplings, anchors, supports, hangers, etc. for complete raceway systems.
2. Size all conduits per the requirements of the NEC; however, minimum conduit size shall be $\frac{3}{4}$ " nominal trade size.
2. Use Schedule 40 polyvinyl chloride (PVC) conduit for circuits run underground and in slabs on grade level. Provide PVC-coated galvanized rigid steel elbows and PVC-coated galvanized rigid steel conduit for all vertical runs extending to a point at least 6" above grade. Galvanized Rigid steel conduit coated with two complete coats of asphaltum or bituminous paint may be used in lieu of PVC-coated galvanized rigid steel conduit.
3. Use Galvanized Rigid Steel (GRS) conduit for all applications where circuits are run above ground exposed to the weather.
4. Use Intermediate Metal Conduit (IMC) for all branch circuits, feeders, and auxiliary circuits requiring conduit 1 $\frac{1}{4}$ " nominal trade size or larger in dry locations.
5. Use Electrical Metallic Tubing (EMT) for all branch circuits and feeders less than 1 $\frac{1}{4}$ " nominal trade size in dry locations and in slabs above grade level.

PART 2 – PRODUCTS

2.1 Products for Raceways

- A. PVC conduits, fittings, couplings, adapters, and accessories shall be UL listed and approved for use with 90 degree Celsius conductors. The UL label shall be affixed to each ten foot length of conduit and each fitting. Conduits shall comply with NEMA Specification TC-2 and UL 651. Fittings shall comply with NEMA TC-3 and UL 514b.
- B. PVC-coated conduits, fittings, couplings, adapters, and accessories shall be UL listed with PVC as the primary corrosion protection. They shall be hot dipped galvanized rigid steel conduit with threads electro-galvanized after cutting. The conduit shall meet UL 6. The fittings shall meet UL 514B. The PVC coating shall be uniformly applied to the interior and exterior of all conduit and fittings. The coating shall be nominally 2 mils thick. The PVC coating shall extend one pipe

diameter or two inches, whichever is less, at every male fitting except unions to fit over the joining female connection. Couplings shall contain a series of longitudinal ribs, 40 mils in thickness, to protect the coating from damage by tools during installation. PVC-coated conduits shall be ETL Verified PVC-001. Fittings shall be manufactured to the same standard. PVC-coated conduit shall be Robroy Plastibond or approved equal.

- C. GRS conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot-dipped galvanized steel. They shall meet the safety standards of UL 6, and shall be manufactured to ANSI C80.1. Threads shall be hot galvanized after cutting.
 - D. IMC conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot-galvanized steel. Fittings, couplings, adapters, and accessories shall be the same as those for GRS conduit described above. IMC shall meet UL 1242 and ANSI C80.6. Threads shall be hot galvanized after cutting. The inside of the conduit shall be finished with a corrosion-resistant coating.
 - E. EMT conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot galvanized steel and shall be produced in accordance with UL 797 and ANSI C80.3. The inside shall be finished with a corrosion-resistant lubricating coating.
 - F. Conduit fittings used with EMT conduits may be set screw indenter type or compression type. All metallic fittings for IMC and Rigid conduit shall be compression type fittings.
 - G. Flexible metallic conduit shall be constructed of galvanized steel and shall be UL listed as compliant with UL 1 and UL 1479.
 - H. Liquidtight flexible conduit shall be constructed of galvanized steel and shall be coated with a PVC jacket to resist liquids, dirt, grease, and oils. All fittings shall be designed, constructed, and installed to maintain the integrity of the liquidtight connections. Liquidtight flexible conduit shall comply with UL 360.
- 2.2 ACCEPTABLE MANUFACTURERS FOR OUTLET BOXES AND JUNCTION BOXES.
- A. Outlet boxes and junction boxes shall be manufactured by Raco, Steel City, Crouse Hinds, or Appleton.

PART 3 – EXECUTION

3.1 CONDUIT EXECUTION

- A. Conduits run underground shall be buried no less than 24" deep. Services and primary conduits feeding transformers shall be buried no less than 48" deep.
- B. **Do not install conduits in or below ground floor slabs, except for service conduits, site lighting, and where specifically indicated on the drawings.**
- C. Do not install conduits within 6" of the deck where a screw down type roof system is utilized.
- D. PVC-coated conduits may be field-bent provided that manufacturer-approved tools are used. Individuals installing PVC-coated conduits shall be trained for installation by factory-certified trainers. Provide evidence of training with equipment brochures.

- E. Support and install all conduits per the latest edition of the National Electrical Code. Support groups of conduits with electrical strut supported by threaded rods anchored to the building structure. Supports shall be designed to hold no less than twice the weight of the conduit and conductors to be supported plus an additional 250 pounds at midspan.
 - F. All conduits shall be grouped and run parallel to each other and to building walls.
 - G. All conduits shall be assembled according to the manufacturer's instructions.
 - H. Conduits run underground shall be assembled to be watertight.
 - I. Cap all conduits during installation. Pull a mandrel sized for that conduit and a cleaning brush through each conduit before installation of any conductors.
 - J. Conduits that are obviously damaged and field bends that are obviously out of round shall be replaced.
 - K. Provide final connections to equipment with flexible metallic conduit. In wet or damp locations, use liquidtight flexible conduit. Flexible conduit shall not exceed 72".
 - L. Terminate conduits entering boxes with a locknut inside the box and a locknut outside the box. Provide protective bushings on all conduit threads. Use watertight hubs where conduit terminations are exposed to moisture.
 - M. Use grounding bushings on all feeder conduits, all underground conduits, and where required by the National Electrical Code.
 - N. Conduits shall be run no closer than 12" to hot water pipes.
 - O. Where conduits are run through the ceiling and are required to make connections to equipment within the room that is not located near a wall, support the conduit from the structural ceiling and provide a flange bolted to the floor. Install a tee conduit fitting in the vertical run of conduit, and make the connection to the equipment with a piece of flexible conduit extending from the tee conduit fitting to the equipment.
 - P. Provide expansion fittings where conduits cross building expansion joints. Provide grounding jumpers between the conduits.
 - Q. Provide EMT conduit sleeves where conduits pass through walls, floors, or footings sized a minimum of two nominal trade sizes larger than the conduit that must pass through the sleeve.
 - R. Equip all empty conduits with a pullwire or string capable of withstanding 200 pounds of pulling tension.
- 3.2 Execution for Outlet Boxes and Junction Boxes.
- A. All devices shall be flush mounted unless specific written permission is obtained from the Engineer for a particular device in a particular location.
 - B. Install outlet boxes in walls, and provide plaster rings such that wall finish contractor's finish is flush against the edge of the plaster ring. Workmanship will not be accepted where the hole in the wall shows behind the cover plate, or the wall finish is uneven or unpainted at the edge of the cover plate.

- C. Use round or square ceiling outlet boxes as required for the device being installed. The ceiling shall be finished flush against the box; the fixture shall completely cover the box and mount tight against the ceiling. Coordinate the requirements of the fixture prior to installing the box.
- D. Provide junction boxes, pull boxes, and conduit fittings where required by the NEC to limit the number of bends in the raceway, and where required to prevent damage to conductors due to long runs.
- E. Junction boxes and pull boxes installed in the ground outside shall be Quazite Composolite or approved equal. Mount the boxes over 24" of washed gravel fill. If splices are to be made inside the boxes, the boxes shall be of the type furnished with a bottom, and all conduit connections shall be watertight. In addition, all conductor splices shall be made watertight using an appropriate splice kit as manufactured by 3M, or an approved equal.

END OF SECTION 260533

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SECTION 260923 - SWITCHES AND RECEPTACLES**PART 1 – GENERAL**

Furnish and install all switches and receptacles in accordance with this specification and the requirements of the NEC.

PART 2 – PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

Switches and receptacles shall be manufactured by Hubbell, Cooper Wiring Devices, Leviton, or Pass & Seymour.

2.2 GENERAL

- A. Switches and receptacles shall be specification grade. They shall have ampacity and voltage ratings suitable for the application in which they are used.
- B. Consult architect or engineer for device colors prior to ordering devices.
- C. Provide brushed stainless steel cover plates for all devices. A single cover plate shall cover all devices in one box.
- D. Light switches shall be 20 Ampere, 120-277V back-wired and side-wired toggle switches. They shall be rated up to 2 HP at 240V. Each switch shall be equipped with a grounding screw. Switches shall be Hubbell CSB series or approved equal.
- E. Duplex NEMA 5-20R receptacles shall be Hubbell HBL 5362A or approved equal.
- F. Duplex GFI NEMA 5-20R receptacles shall be Hubbell HBL GF5362A or approved equal.
- G. Weatherproof while-in-use cover plates shall be Teddico #34017-7 or approved equal. Cover plates shall be single gang, lockable, and constructed of heavy duty die cast metal.
- H. All 125V, 15 and 20 ampere receptacles installed in dwelling units shall be of the tamper-resistant type.
- I. All 15 and 20 ampere, 125 and 250V non-locking receptacles installed in wet or damp locations shall be listed as the weather-resistant type.
- J. Devices furnished in this Contract, but not listed above, shall be of the same standard of quality as those items listed.

PART 3 – EXECUTION

- 3.1 Flush mount all devices unless specific written permission is obtained from the Engineer for a particular device in a particular location.
- 3.2 Install all devices vertically unless the drawings specifically state that the particular device should be mounted horizontally.
- 3.3 Install receptacles with the ground slot up.

END OF SECTION 260923

SECTION 260926 - VACANCY SENSORS**PART 1 - GENERAL**

- 1.1 Furnish and install a complete system of Vacancy sensors as shown on the drawings and as specified herein to comply with IECC 2012. The drawings are provided to show the general scope of the work, and show the absolute minimum components required. Actual system components, quantities, and locations shall be determined by the motion detector vendor and provided to the Contractor with the installation shop drawings.
- 1.2 The Contractor and Sales Representatives are advised to take notice of specified component characteristics when attempting to select and propose substitutions. It is highly unlikely that substitutions on a one-for-one component basis will produce results that provide acceptable system performance.
- 1.3 Provide all power packs, hardware, software, devices, circuitry, and other components, material, and labor required to install, configure, and test the entire system to the satisfaction of the Architect, Owner, and Engineer.
- 1.4 Submit six sets of manufacturer's cut sheets describing completely all equipment, and six sets of shop drawings showing all circuitry including terminal-to-terminal connections.
- 1.5 The wiring diagrams on these drawings are based on our best interpretation of the manufacturer's data that was available at the time of design; however, they shall not be used for system installation and configuration. The controls equipment vendor is expected to be thoroughly knowledgeable of the equipment that is being proposed, and shall provide detailed shop drawings tailored for each circuit and lighting zone on the project. General manufacturer's data sheets shall not be acceptable. The shop drawings shall be suitable for the installing electrician to use for complete installation of the circuitry without referring to data sheets or installation manuals for connection of lighting control equipment. These requirements shall be followed whether the specified equipment, or products of other manufacturers, is provided.

PART 2 - PRODUCTS

- 2.1 Hallway Vacancy sensors: Vacancy sensors used in the hallways shall be passive infrared, ceiling-mounted units with a coverage of 6' x 130'. They shall be Sensor Switch HW13 WV BR or approved equal.
- 2.2 Wall mounted LED lighting controls shall be 0-10V dimmer/vacancy sensor type equal to Lutron MS-Z101-V-XX
- 2.3 Wall mounted lighting controls shall be dual technology (ultrasonice/passive infrared) dual relay vacancy sensor type equal to Lutron MS-B202-V-XX
- 2.4 Areas up to 500 Square Feet: Ceiling mounted Vacancy sensors used in areas up to 500 square feet shall be dual technology infrared and passive infrared, ceiling-mounted units with a 360 degree, 500 square foot coverage.

- 2.5 Power Packs: Power packs shall be of the same manufacturer as the Vacancy sensors. Each shall be capable of controlling a 20 ampere circuit. They shall be rated for operation at the voltage of the system on which they will be used.
- 2.6 Circuitry: Provide control circuitry as required by the manufacturer for optimum system operation, but no less than the following: Control cables shall be 3-conductor #22 AWG copper with an overall jacket. Adjust conductor sizes as required to overcome unacceptable voltage drop.

PART 3 - EXECUTION

- 3.1 Vacancy sensors shall be provided so that their coverage areas overlap and there are no dead zones in the rooms where persons may stand and not be detected.
- 3.2 Vacancy Sensors shall be set for "manual on/automatic off" operation.
- 3.3 All work shall be done by qualified system technicians.
- 3.4 Wiring, including control wiring, shall be in Raceways meeting Specification 260533.
- 3.5 Guarantee workmanship and material for a period of one year after final acceptance. During the warranty period, repair or replace faulty equipment at no cost to the Owner for labor, material, or expenses.
- 3.6 Upon completion of job, test entire system. After testing submit a certificate to the Architect stating verification of the following:

PART 4 – CLOSE-OUT DOCUMENTS

- 4.1 Provide the following documents to the Architect for delivery to the Owner at the time of substantial completion:
- A. Written Guarantee
 - B. Two sets of data prepared by the manufacturer for each item of electrical equipment completely describing each piece of equipment. The data shall include parts lists, a description of operation, shop drawings, wiring diagrams, maintenance procedures, and other literature required for operation and maintenance of equipment.
- 4.2 Instruct the Owner on system operational procedures. Notify the Owner and Architect at least one week in advance of the training session. Provide written step-by-step instructional material.
- 4.3 Notify the General Contractor that you are to present during the Pre-final Inspection. During that inspection, demonstrate all system functionality and capabilities; remove cover plates and panels covers as required to show the quality of the installation. The Owner, Architect, and

Engineer reserve the right to reject unsuitable workmanship or performance.

END OF SECTION 260926

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SECTION 262400 - PANELBOARDS**PART 1 – GENERAL**

- 1.1 Furnish and install all panelboards, complete with their circuit breakers, phase buses, neutral buses, ground buses, structural supports, and other equipment necessary for complete systems.
- 1.2 The equipment vendor shall perform all calculations necessary and provide complete Arc Flash Labels as required by the National Electrical Cod (NEC) and the drawings. Note: The drawings typically require more detail than required by the NEC.

PART 2 – PRODUCTS**2.1 GENERAL**

- A. Panelboards shall be designed, manufactured, and tested to be in compliance with NEMA PB 1, UL 50, UL 67, UL 489, NFPA 70, and the ASTM.
- B. Circuit breakers shall be designed, manufactured, and tested to be in compliance with NEMA AB 1, UL 489, and Federal Specification W-C-375B/GEN.
- C. Panelboards shall be UL listed for service entrance where used for that purpose.
- D. Panelboard ampere interrupting current (AIC) ratings shall equal the lowest rated device in the panelboard. Provide panelboards with the AIC ratings shown on the Contract Drawings. Buses shall be braced to withstand the AIC rating shown on the drawings. Series ratings shall only be used where shown on the panelboard schedules.
- E. All panelboards shall be furnished with dead-front, door-in-door construction.
- F. Lug locations shall be determined during the creation of shop drawings for proper arrangement with the raceway system.
- G. Buses shall be constructed of 98% conductivity copper or equivalently rated aluminum.
- H. Panelboard enclosures shall be NEMA 1 when they are to be mounted indoors, and NEMA 3R when they are to be mounted outdoors. Provide special enclosures where shown on the Contract Drawings.

2.2 ACCEPTABLE MANUFACTURERS

Panelboards shall be manufactured by Siemens, Square D, General Electric, or Cutler Hammer.

2.3 PANELBOARD CLASSES

- A. Power distribution panelboards shall be available with mains and branch devices up to 1200 amperes. AIC ratings shall be available up to 200,000 Amperes. Power distribution panelboards shall be equipped with a nameplate containing the appropriate system voltage, number of wires, and number of phases for the system on which they are installed.
- B. In 480Vac and less applications where a main breaker not exceeding 600 Amperes is required, the AIC rating does not exceed 65,000 Amperes, and no branch breakers exceed 125Amperes, Square D NF and equivalent panelboards may be used.
- C. In 480Vac and less applications where a main breaker not exceeding 225 Amperes is required, the AIC rating does not exceed 14,000 Amperes, and no branch breakers exceed 100Amperes, Square D NEHB and equivalent panelboards may be used.
- D. In 240Vac and less applications where a main breaker not exceeding 400 Amperes or main lugs not exceeding 600 Amperes is required, the AIC rating does not exceed 22,000 Amperes, and no branch breakers exceed 125 Amperes, Square D NQOD and equivalent panelboards may be used.

2.4 CIRCUIT BREAKERS

- A. Circuit breakers shall be thermal magnetic, molded-case with quick-make, quick-break contact action. They shall have thermal and magnetic tripping elements on each pole. Breakers with multiple poles shall have common tripping of all poles. Circuit breaker ampere ratings shall be stamped on the handle. Interrupting ratings of the circuit breakers shall be equivalent to the specified AIC rating of the panelboard. Breakers handles shall reside in a position between "ON" and "OFF" after a trip condition. Breakers shall be rated HACR when used for heating, air-conditioning, and refrigeration; HID when used with High Intensity Discharge fixtures; and shall be rated SWD when used for switching duty.
- B. Circuit breaker sizes for motor loads are based on Square D recommendations for use of their breakers at the motor horsepowers listed on the mechanical drawings. If equipment is used other than Square D, adjust breaker sizes per the manufacturer's recommendations.
- C. Each circuit breaker supplying a multiwire branch circuit shall be installed with a manufacturer supplied handle tie to simultaneously disconnect all ungrounded conductors. Each multiwire branch circuit shall comply with NEC article 210.4.
- D. Circuit breakers with slash ratings, such as 120/240V or 480Y/277V, shall be used in solidly grounded systems where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the breaker's voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker's voltage rating.
- E. Circuit breakers with straight voltage ratings, such as 240V or 480V, shall be used in systems other than solidly grounded systems (Corner-Grounded Delta, Ungrounded, Impedance Grounded, etc.) where the nominal voltage between any two conductors does

not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used to protect a three-phase, Corner-Grounded Delta system unless the circuit breaker is marked 1 -3 .

PART 3 – EXECUTION

- 3.1 Install panelboards in complete compliance with all manufacturers' installation instructions.
- 3.2 Install conductors neatly in panelboards. Group and tie-wrap circuits that share a common neutral.
- 3.3 Number circuits exactly as shown on the contract drawings.

END OF SECTION 262400

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SECTION 262800 - DISCONNECTS AND SEPARATELY-MOUNTED CIRCUIT BREAKERS**PART 1 – GENERAL**

Furnish and install all disconnects and separately mounted circuit breakers as shown on the drawings, specified herein, and required by the NEC.

PART 2 – PRODUCTS**2.1 GENERAL**

- A. Disconnects shall be of the heavy-duty type, and shall be UL listed for service entrance use. They shall meet or exceed the requirements of NEMA Standard KS1. Provide fuses sized to appropriately protect the load served. Equipment manufacturer's recommendations shall take precedence over the Contract Drawings.
- B. Fuses shall be dual element, time-delay, Class J fuses. They shall be Bussman Low-Peak or approved equal.
- C. Circuit breakers shall be thermal magnetic, molded-case with quick-make, quick-break contact action. They shall have thermal and magnetic tripping elements on each pole. Breakers with multiple poles shall have common tripping of all poles. Circuit breaker ampere ratings shall be stamped on the handle. Interrupting ratings of the circuit breakers shall be equivalent to the specified AIC rating of the panelboard. Breakers handles shall reside in a position between "ON" and "OFF" after a trip condition. Breakers shall be rated HACR when used for heating, air-conditioning, and refrigeration; HID when used with High Intensity Discharge fixtures; and shall be rated SWD when used for switching duty.
- D. Circuit breaker sizes for motor loads are based on Square D recommendations for use of their breakers at the motor horsepowers listed on the mechanical drawings. If equipment is used other than Square D, adjust breaker sizes per the manufacturer's recommendations.
- E. Circuit breakers with slash ratings, such as 120/240V or 480Y/277V, shall be used in solidly grounded systems where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the breaker's voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker's voltage rating.
- F. Circuit breakers with straight voltage ratings, such as 240V or 480V, shall be used in systems other than solidly grounded systems (Corner-Grounded Delta, Ungrounded, Impedance Grounded, etc.) where the nominal voltage between any two conductors does not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used to protect a three-phase, Corner-Grounded Delta system unless the circuit breaker is marked 1 -3 .
- G. Disconnect and individually-mounted circuit breaker ampere interrupting current (AIC) ratings shall equal the rating of the panelboard from which they are fed unless otherwise noted.
- H. Buses shall be constructed of 98% conductivity copper or equivalently rated aluminum.
- I. Switches shall be horsepower rated where used to serve motors.
- J. Enclosures shall be NEMA 1 when they are to be mounted indoors, NEMA 3R when they are to be mounted outdoors, and NEMA 4X where they are subject to washdown. Provide special enclosures where shown on the Contract Drawings.

2.2 ACCEPTABLE MANUFACTURERS

Disconnects and separately-mounted circuit breakers shall be manufactured by Siemens, Square D, General Electric, or Cutler Hammer.

PART 3 – EXECUTION

- 3.1 Install disconnects and individually-mounted circuit breakers in complete compliance with all manufacturers' installation instructions. Where necessary, provide structural supports and bracing for installation.
- 3.2 Disconnects are to be surface-mounted.
- 3.3 Individually-mounted circuit breakers are to be flush-mounted unless otherwise shown.

END OF SECTION 262800

SECTION 265100 - LIGHTING**PART 1 – GENERAL**

Provide all lighting fixtures (luminaires), lamps, end caps, connectors, fittings, structural support members, supports, brackets, etc., for a complete and operable lighting system.

PART 2 – PRODUCTS**2.1 LUMINAIRES**

- A. Luminaires are shown in the Luminaire Schedule on the drawings to establish a standard of quality. Manufacturer's names and model numbers shall not be interpreted as a proprietary specification. Notify the engineer at least two weeks prior to bid if an equivalent for a fixture listed in the schedule is not readily available,
- B. Prior to submitting electrical equipment brochures for review and approval, coordinate with the General Contractor and verify that the fixtures are appropriate for the ceiling types in which they are shown to be installed. Also verify that ballast voltage on the submittals is appropriate for the electrical system on which the fixtures are to be installed (regardless of voltage listed in the part number in the Fixture Schedule). Submit with equipment brochures a certificate stating that these items of coordination have been completed.

2.2 LED

- A. LED fixtures shall be LM79 and LM80 tested. Color temperature shall be as specified on the drawings.
- B. Lumen outputs listed on the drawings are minimum requirements.
- C. Fixtures shall have a minimum 80CRI.

2.3 BATTERIES

- A. Emergency Batteries: Emergency batteries in fixtures shall consist of an automatic power failure device, a test switch, and a pilot light that is visible from outside of the fixture. They shall contain a fully automatic solid state charger in a self-contained power pack. The fixture shall be factory wired in a manner that will allow the emergency lamps to be switched while still maintaining charging power to the battery. Wiring Diagrams shall be furnished with the fixture showing switching connections. The battery shall be of the sealed electrolyte type with the capacity to provide power to the lamps provided for a minimum of 90 minutes.

The battery shall be able to operate unattended with no maintenance for a period of no less than five years. Emergency batteries shall be fully compatible with solid state

ballasts. Battery packs shall be mounted inside the fixture unless remotely mounted ballasts are shown on the drawings.

2.4 SUPPORTS

- A. Provide all structural members necessary to support fixtures in locations shown on the contract drawings. Submit mounting and support details to the Architect or Engineer for approval with the project shop drawings. Notify the General Contractor prior to bid of any structural work that will be required to support the fixtures.
- B. Provide hangers, cords, stems, etc., where required. Coordinate with the Architect or Engineer for proper stem lengths prior to ordering fixtures.
- C. Support the ceiling grid at all four corners of recessed light fixtures.
- D. Provide clips for fixtures installed in lay-in ceilings. Clips shall be equal to Erico Caddy clips # 515 or #515A.

PART 3 – EXECUTION

- 3.1 Raceways for lighting systems in accessible ceilings shall be run to junction boxes mounted in locations that do not interfere with the ceiling installation, the luminaire installation, or other building systems. Provide final connections to fixtures using conductors in flexible conduit. Flexible conduit whips shall not exceed six feet in length.
- 3.2 All recessed fixtures shall be mounted with their trims flush against the ceiling.
- 3.3 Comply completely with all manufacturers' installation instructions.
- 3.4 LED fixtures shall be warranted for 5 years after beneficial occupancy.

END OF SECTION 265100

DIVISION 27
COMMUNICATIONS

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SECTION 275116 - INTERCOM SYSTEM**PART 1 – GENERAL****1.1 INTERCOM GENERAL**

- A. Comply completely with the latest edition of all applicable federal, state, and local codes including, but not limited to the following:
 - 1) National Electrical Code (NFPA 70)
 - 2) Life Safety Code (NFPA 101)
 - 3) National Fire Alarm Code (NFPA 72)
 - 4) The International Building Code
 - 5) ANSI/ASME A17.1, Safety Code for Elevators and Escalators
- B. Furnish and install all components necessary to expand the existing Bogen MCP-35A intercom system at Ruleville Elementary. The Construction Drawings are diagrammatic; they are intended to show the basic system components and the overall scheme of operation. They are not intended to show all system components. The contractor shall provide all equipment, materials, devices, conduit, circuit breakers, fuses, circuitry, etc. for a complete and operable system.

1.2 SCOPE OF WORK

- A. Provide all enclosures, hardware, software, devices, and all other components, material, and labor required to install, configure, and test the entire system to the satisfaction of the Engineer and all authorities.
- B. All components of the system shall be manufactured by the same company. The system and its components shall be approved by UL and Factory Mutual.
- C. All new Intercom System components shall be completely compatible with the existing system.

1.3 QUALIFICATIONS:

- A. The Contractor furnishing and installing the intercom system shall be a licensed distributor for the system being installed. The Contractor shall regularly provide systems of the size, scope, and quality specified.
- B. The Contractor shall have completed five projects in the last 2 years of the same complexity and dollar value.
- C. The Contractor shall employ qualified electronic technicians, trained in the installation, setup, and repair of systems of the type specified.

1.4 SUBMITTALS:

- A. Submit six sets of the following documents to the Architect for the Engineer's review and approval prior to ordering any equipment:

1. Technical specification sheets on each equipment item.
 2. Complete wiring diagram indicating wire and cable numbers, terminal strip designations, and equipment model numbers.
 3. Equipment mounting elevations.
 4. Single line diagram.
 5. Floor plans showing all equipment locations and conduit routing.
- B. Submit complete shop drawings showing all devices including mounting locations and heights and terminal-to-terminal connections. Employ an independent third party testing agency to certify the system and to review the shop drawings to ensure compliance with the contract documents and all applicable codes.

PART 2 – PRODUCTS

2.1 Intercom.

- A. All equipment shall be new, U.L. listed equipment.
- B. Equipment manufacturers and model numbers mentioned within this specification are to establish a standard of quality and should not be construed as limiting proposals; however, the Contractor shall be responsible for proving equivalence.
- C. Staff Stations: Staff stations shall match the existing type located at each school. Outlet boxes shall be mounted flush.
- D. Ceiling-Mounted Speakers shall be 8 inch, 6 oz., flush ceiling mount speakers with 25V impedance-matching transformers. Speakers shall be Bogen S86T725CG8AW or approved equal. Furnish speakers complete with backboxes, T-grid ceiling supports where required, and aluminum baffle finished with semi-gloss white enamel. Provide appropriate mounting hardware for ceiling into which the individual speakers will be installed.
- E. Indoor Wall Mounted Speakers shall be similar to the ceiling-mounted speakers described above, but shall be mounted in a painted, wall-mounted enclosure. Walnut enclosures shall not be acceptable. Consult Architect for paint finish.
- F. Outdoor Speakers shall be weatherproof, 15 watt horn type speakers with a 25V transformer. Outdoor Speakers shall be Bogen SPT-15A or approved equal.
- G. Terminal Blocks: All conductors in cabinets, on equipment racks, etc. shall be terminated on Siemens 66M1-50 punch blocks or approved equal.
- H. Speaker Cabling: All speaker cabling shall be stranded, twisted, shielded pairs with PVC jacket and a tinned copper drain wire. The shield shall be an aluminum polyester foil providing 100% coverage. The conductors shall be sized as required for system to function appropriately, but shall not be less than #22 AWG.
- I. Homerun Cabling: Cabling between the speaker and the Staff Station in the

classroom as well as homerun cabling back to the amplifier shall consist of a twisted pair of #22 AWG conductors, a shielded twisted pair of #22 AWG conductors, and a tinned copper drain wire. The shield shall be an aluminum polyester foil providing 100% coverage. Homerun cabling shall be West Penn #357 or approved equal. Increase the size of the conductors as required to ensure proper operation of the system where distances exceed the performance parameters of #22 AWG conductors.

- J. Conduit shall be EMT sized per the NEC, but no less than 3/4" nominal trade size.

PART 3 – EXECUTION

3.2 Intercom.

- A. All wiring shall be installed in conduit. Conduit shall be run concealed.
- B. Install all components per the manufacturer's specifications and instructions.
- C. Furnish terminal strips, punch blocks, and connectors for all interconnections.
- D. Identify all normally operated controls and electronic devices with an engraved plastic nameplate.
- E. Installation Testing: Set taps and adjust speakers for Architect's approval. Demonstrate all features of system. Submit a signed Certificate at the end of system testing certifying that all equipment has been installed in accordance with the manufacturer's requirements and the system is operating properly.
- F. Guarantee, workmanship and/or material executed under this division for one (1) year after final acceptance. During the warranty period, the Owner shall receive repairs and replacement of faulty equipment at no cost for labor, material, or expenses. A repair technician shall respond to Owner calls by arriving at the school within twenty-four hours of any repair request.
- G. Coordinate work with other trades. Notify the electrical power system contractor of all power requirements for your equipment prior to bid. Include all labor, installation, and equipment costs for additional power system components not shown on the contract drawings, but required by your equipment in your bid. Notify the Engineer of any conflicts at least ten days prior to bid.
- H. Install work in accordance with the General Contractor's schedule.

PART 4 – CLOSE-OUT DOCUMENTS

- 4.1 Provide the following documents to the Architect for delivery to the Owner at time of substantial completion:
 - A. Written guarantee.

- B. Two (2) sets of data prepared by the manufacturer for each item of electrical equipment completely describing each piece of equipment. The data shall include parts lists, description of operation, shop drawings, wiring diagrams, maintenance procedures and other literature required for maintenance of equipment. The data shall reflect as-built conditions.
- 4.2 Instruct the Owner on system operational procedures. Notify the Owner and Architect at least one week in advance of the training session. Provide written instructional material.
- 4.3 Notify the General Contractor that you are to be present during the system pre-final inspection. During that inspection, demonstrate all system functionality and capabilities; remove cover plates and panels as required to show the quality of the installation. The system shall demonstrate proper operation and operate without any audible hum, distortion, or erroneous noises. The Owner, Architect, and Engineer reserve the right to reject unsuitable workmanship or performance.

END OF SECTION

DIVISION 28
ELECTRONIC SAFETY AND SECURITY

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SECTION 283101 - FIRE ALARM SYSTEM**PART 1 – GENERAL**

1.1 GENERAL

- A. Furnish and install all components necessary to expand the existing fire alarm system to include the items shown on the drawings. The expanded system shall be a complete and operable fire alarm system in accordance with the Contract drawings and as specified herein.
- B. The items added in the existing building should be added to the appropriate existing zone for that area of the building.
- C. Comply completely with the latest edition of all applicable federal, state, and local codes including, but not limited to the following:
 - 1) National Electrical Code (NFPA 70)
 - 2) Life Safety Code (NFPA 101)
 - 3) National Fire Alarm Code (NFPA 72)
 - 4) The Standard Building Code
 - 5) ANSI A17.1, "Elevators, Dumbwaiters, Escalators, and Moving Walks"

1.2 SCOPE OF WORK

- A. Provide all enclosures, hardware, software, devices, and all other components, material, and labor required to install, configure, and test the entire system to the satisfaction of the Engineer and all authorities.
- B. All components of the system shall be manufactured by the same company. The system and its components shall be approved by UL and Factory Mutual.
- C. All system components shall be installed by a franchised distributor of the fire alarm system components having a repair and service department on call 24 hours a day, seven days a week. The repair and service department shall be located within 150 miles of the project.
- D. Submit complete shop drawings showing all devices including mounting locations and heights and terminal-to-terminal connections.
- E. **Employ an independent third party testing agency that shall be responsible for certification of the system and to review the shop drawings to ensure compliance with the contract documents and all applicable codes.**

PART 2 – PRODUCTS

- 2.1 Provide additional battery capacity as required to operate the control panel without normal power for 24 hours, and then to alarm the panel continuously for at least five minutes. Submit battery sizing calculations with the manufacturer's cut sheets and shop drawings. Any new batteries required by the new equipment shall be NiCad.

- 2.2 All devices shall be completely compatible with the existing system.
- 2.3 Pull stations shall be of metallic construction. They shall be furnished with lexan shields and warning horns.
- 2.4 Horns shall be rated a minimum of 85 dB at 10'.
- 2.5 Strobes shall have a nominal rating of at least 75 Cd.
- 2.6 Smoke detectors, except under raised computer floors, shall be of the ionization type.
- 2.7 Combination horn-strobe and speaker-strobe units shall meet the specified requirements of the individual horns, speakers, and strobes.
- 2.8 Provide duct detectors in all air units.
- 2.9 Provide all necessary relays and circuitry, and shut down all air units upon an alarm condition of the fire alarm system.
- 2.10 Provide all necessary relays and circuitry, and release magnetic locks upon an alarm condition of the fire alarm system.
- 2.11 Provide all necessary relays and circuitry, and release door hold-open magnets upon an alarm condition of the fire alarm system.
- 2.12 Conductors shall be #14 AWG copper rated THHN/THWN. Provide larger conductors where required to compensate for voltage drop.
- 2.13 All conductors shall be enclosed in raceways per Specification 260533.

PART 3 – EXECUTION

- 3.1 All components and circuitry shall be assembled and installed per the requirements of all applicable codes and the manufacturer's recommendations.
- 3.2 All devices shall be mounted with their boxes flush in the walls.
- 3.3 Smoke detectors shall be mounted at least 36" away from supply vents.
- 3.4 All circuitry shall be in concealed conduit sized per the NEC, but no less than ½" EMT.
- 3.5 The Fire Alarm System Contractor shall test all system components, including each smoke detector and duct detector prior to the pre-final inspection. All systems shall be completely operable prior to the request for a pre-final inspection. Fire Alarm System factory-trained technicians shall be present at the pre-final inspection to test the system in the presence of the Owner, Architect, and Engineer.

END OF SECTION 283101

DIVISION 31
EARTHWORK

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SECTION 312318 - EARTHWORK FOR STRUCTURES

PART 1 GENERAL

1.1 RELATED SECTIONS

- A. Division 1 Sections

1.2 REFERENCES

ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils.

ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).

ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.3 DEFINITIONS

- A. Granular Subbase: Fill directly beneath slabs-on-grade.
- B. Backfill: Fill immediately behind foundation elements or retaining walls.
- C. Structural Fill: Fill under the structure other than the granular subbase.

1.4 SUBMITTALS

- A. Upon request, submit soil test reports performed by the Structural Testing/Inspection Agency.

1.5 QUALITY ASSURANCE

- A. Structural Testing/Inspection Agency shall perform the following quality related items:
 - 1. Verify structural fill complies with Specifications.
 - 2. Determine particle size, liquid limit, plastic limit, plasticity index and maximum density of each type of soil.
 - 3. Observe proofrolling.
 - 4. Perform a sufficient number of field density tests to verify compaction of structural fill. As a minimum, perform one test per lift for every 2500 square feet of fill placed.
 - 5. Verify foundation bearing capacity.
 - 6. Verify quantities of material removed and quantities of material placed where Unit Prices are involved.

1.6 SURVEY

- A. Prior to construction, have structure location staked and certified by a licensed surveyor. If discrepancies between actual lines and elevations exist, notify Architect/Structural Engineer before proceeding with layout of structure.

1.7 SUBSURFACE CONDITIONS

- A. Copies of a subsurface investigation of the site will be made available upon request. The data is not intended as a representation or warranty of the continuity of such conditions. Owner will not be responsible for interpretation or conclusions drawn by the Contractor. The data is made available for the convenience of the Contractor and is not guaranteed to represent all conditions that may be encountered.
- B. Contractor may examine the site and make his own subsurface explorations at no additional cost to the Owner. Notify Owner prior to making any subsurface explorations.

1.8 EXISTING UTILITIES

- A. Locate existing underground utilities by careful hand excavation. If utilities are to remain in place, provide protection from damage during construction operations.
- B. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Owner or others, unless written permission is given by the Architect and then only after temporary utility services have been provided.
- C. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Architect immediately for directions.
- D. Repair damaged utilities to satisfaction of utility owner.

1.9 NOTICE

- A. Notify the Architect/Structural Engineer 48 hours prior to the beginning of any excavation work.

PART 2 PRODUCTS

2.1 GRANULAR SUBBASE

- A. Granular Subbase: Clean, fine-graded material with at least 10 to 30 percent of particles passing a No. 100 sieve but not contaminated with clay, silt, or organic material. The material shall have a uniform distribution of particle sizes ranging from No. 4 to the No. 200 sieve. Refer to ASTM C 33, Table 1, for limitation of deleterious material finer than No. 200 sieve. Unwashed size No. 10 per ASTM D 448 and manufactured sand from a rock-crushing operation is acceptable.

2.2 BACKFILL

- A. Backfill: Sound and free-draining, such as sand, gravel or crushed stone with less than 10% passing the 200 sieve. Maximum diameter shall be 1-1/2 inches.

2.3 STRUCTURAL FILL

- A. Structural Fill: Material with a liquid limit less than 40 and plasticity index between 10 and 20 and rocks not greater than 6 inches.
- B. Structural Fill shall be free of organics, debris and deleterious materials.

PART 3 EXECUTION

3.1 STRIPPING

- A. Strip vegetation, topsoil, roots, and other unsuitable material to a depth determined by the Structural Testing/Inspection Agency but not less than one foot, nor less than 10 feet outside the perimeter of the structure.
- B. Stockpile sufficient amounts of topsoil as required to cover areas to be landscaped with a minimum of six inches of material.

3.2 EXCAVATION

- A. Excavation shall be considered unclassified. Excavations shall comply with U.S. Department of Labor, Occupation Safety and Health Administration (OSHA) regulations.
- B. Perform excavation to the depths and limits on the Drawings and as specified herein.
- C. Do not excavate to full depth when there is probability of frost forming or ground freezing in excavation before concrete is placed.
- D. Under-cut the entire building area to 5-feet below the bottom of slab or exterior grade and extending 5-feet outside perimeter walls of all structures at the base of the cut.
- E. Ground water may be encountered during the foundation excavation. Provide a system for controlling the ground water to a level at least three feet below the lowest point of the excavation.
- F. Keep excavations dry by sloping ground away from holes and trenches.

3.3 PROOFROLLING

- A. After stripping or excavation and before any fill placement, fill areas shall be proofrolled with a minimum of two coverages of a loaded dump truck or scraper in each of two perpendicular directions.
- B. Areas found to be soft or pumping shall have the soft soil removed and replaced with structural fill and compacted as outlined herein.

3.4 PLACEMENT OF STRUCTURAL FILL

- A. Do not place structural fill on subgrade that contains frost, mud or is frozen.
- B. Structural fill shall be placed and compacted in 8-inch thick loose layers.

- C. Compact structural fill to 98 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within ± 2 percent of the optimum moisture content.

3.7 PLACEMENT OF BACKFILL

- A. Backfill behind wall shall be placed in layers of six inches.
- B. Compact backfill behind walls to 95 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with water content within ± 2 percent of the optimum moisture content.

3.8 PLACEMENT OF GRANULAR SUBBASE

- A. Do not place granular subbase on subgrade that contains frost, mud or is frozen.
- B. Compact granular subbase to 98 percent of the maximum dry density as measured by Standard Proctor, ASTM D698, with the water content within ± 2 percent of the optimum moisture content.

3.9 CLEAN UP

- A. Remove excess excavated materials from job site and upon completion leave site in clean condition.

END OF SECTION 312318

SECTION 316334 - HELICAL PILES

PART 1 GENERAL

1.1 Description

This work pertains to furnishing and installing Helical Piles, Helical Anchors, and Bracket Assemblies shown in the Contract in accordance with the Drawings and this specification. Each Helical Pile and Helical Anchor shall be installed at the location and to the elevation, minimum length, installation torque, and allowable capacities shown on the Plans or as established. This work also pertains to load testing and pre-loading Helical Piles and Helical Anchors (if required on the Drawings).

1.2 Referenced Codes and Standards

This specification is based on nationally recognized codes and standards including the references listed below. In case of a conflict between the reference and this specification, this specification shall govern.

A. American Society for Testing and Materials (ASTM):

1. ASTM A36/A36M Structural Steel
2. ASTM A123-02 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
3. ASTM A153-05 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
4. ASTM A450/A450M-07 Standard Specification for General Requirements for Carbon and Low Alloy Steel Tubes
5. ASTM D1143/D1143M-07 Standard Test Method for Piles Under Static Axial Compressive Load
6. ASTM D3689 Standard Test Method for Individual Piles Under Static Axial Tensile Load
7. ASTM D3966-07 Standard Test Method for Piles Under Lateral Loads

B. American Society of Mechanical Engineers (ASME):

1. ANSI/ASME Standard B18.2.1-1996, Square and Hex Bolts and Screws, Inch Series

C. Occupational Safety and Health Administration (OSHA):

1. Excavation Safety Guidelines

D. ICC-Evaluation Services, Inc.:

1. AC308 Acceptance Criteria for Helical Foundation Systems and Devices

E. American Welding Society

1. ANSI/AWS B2.1-00 Standard for Welding Procedure and Performance Qualification

1.3 Definitions

- A. Helical Pile: Manufactured steel foundation with one or more helical bearing plates that is rotated into the ground to support structures.
- B. Helical Anchor: Same as a Helical Pile. Term generally used when axial tension is the primary service load.
- C. Engineer: Individual or firm retained by Owner or General Contractor to verify Helical Pile and Helical Anchor quality assurance with the Contract, the Drawings, and this specification.
- D. Allowable Bearing Capacity: Ultimate bearing capacity of the bearing stratum divided by a factor of safety.
- E. Lead Section: The first section of a Helical Pile or Helical Anchor to enter the ground. Lead Sections consist of a central shaft with a tapered end and one or more helical bearing plates affixed to the shaft.
- F. Extension Section: Helical Pile or Helical Anchor sections that follow the Lead Section into the ground and extend the Helical Lead to the appropriate depth. Extension Sections consist of a central shaft and may have helical bearing plates affixed to the shaft.
- G. Brackets: Cap plate, angle, thread bar, or other termination device that is bolted or welded to the end of a Helical Pile or Helical Anchor after completion of installation to facilitate attachment to structures or embedment in cast-in-place concrete.
- H. Augering: Rotation of the shaft with little or no advancement. It can occur when the helical bearing plates pass from a relatively soft material into a comparatively hard material. Augering can also result from insufficient crowd or downward pressure during installation. In some cases, augering may be (temporarily) necessary in order to grind through an obstruction.
- I. Pile Design Professional: Individual or firm responsible for the design of Helical Piles, Helical Anchors, and Brackets.

1.4 Qualifications

- A. Due to the special requirements for manufacture and quality control of Helical Piles, Helical Anchors, and Brackets, all Helical Piles, Helical Anchors and Brackets shall be obtained from a company specializing in the manufacturing and distribution of these products.

Manufacturer qualifications for this project shall be submitted to the Engineer for review not less than seven (7) calendar days prior to the bid date. The submittal shall include:

1. A product catalog and all necessary technical data sufficient to qualify the proposed product substitution.
2. Evidence showing manufacturer has at least ten (10) years experience in the design and manufacture of Helical Piles and Helical Anchors.
3. Current ICC-ES product evaluation report or complete description of product testing and engineering calculations used to assess product capacity.
4. Current ISO 9001:2008 certification.

- B. Due to the special requirements for installation of Helical Piles, Helical Anchors, and Brackets, all Helical Piles, Helical Anchors, and Brackets shall be installed by an organization specializing in the installation of those products.

Any Contractor desiring to bid as the Helical Pile and Helical Anchor installer for this project shall submit a request to the Engineer for review not less than seven (7) calendar days prior to the bid date. The request must include:

1. Evidence the Contractor has completed training in the proper methods of installation of Helical Piles and Helical Anchors and the mounting of Brackets.
2. A recent company brochure indicating experience in this type of work.
3. Evidence of having installed Helical Piles and Helical Anchors on at least ten (10) projects, including project name, number and type of Helical Piles or Helical Anchors, project location, and client contact information.
4. Resume of Contractor's foreman including experience in the oversight of Helical Pile and Helical Anchor installation on at least five (5) projects in the last five (5) years, including project name, number and type of Helical Piles or Helical Anchors installed, project location, and client contact information.
5. List of installation and testing equipment and detailed description of proposed method of installation and load testing Helical Piles and Helical Anchors (if testing is required).
6. Current ANSI/AWS welding certificate and documentation of welder experience within the last 5 years (if welding is required).

- C. Due to the special requirements for design of Helical Piles, Helical Anchors, and Brackets, all Helical Piles, Helical Anchors, and Brackets shall be designed by a licensed design professional specialized in the engineering and design of Helical Piles and Helical Anchors. Pile Design Professional's qualifications shall be submitted to the Engineer for review not less than seven (7) calendar days prior to the bid date. The submittal shall include:

1. The curriculum vitae of the designated Pile Design Professional indicating at least ten (10) years experience in this type of work as well as graduate education in structural and/or geotechnical engineering.
2. Evidence of Pile Design Professional having designed Helical Piles and Helical Anchors on at least ten (10) projects, including project name, number and type of Helical Piles or Helical Anchors, project location, and client contact information.
3. Professional errors and omissions liability insurance certificate.
4. Evidence of current license to practice engineering in the project state.

- D. Prior to submitting a bid for the project, written approval to bid must be received from the Engineer. Engineer shall grant approval based on compliance with specific criteria herein. The Engineer's decision is final.

1.5 Submittals

- A. Contractor shall prepare and submit to the Engineer for review and approval, Shop Drawings and specifications for the Helical Piles and Helical Anchors intended for use on the project at least 14 calendar days prior to planned start of installation. The Shop Drawings shall include the following:

1. Helical Pile and Helical Anchor product identification number(s) and designation(s)
2. Maximum allowable mechanical compression and tensile strength of the Helical Piles and Helical Anchors
3. Number of Helical Piles and Helical Anchors and respective design allowable capacities from the Drawings

4. Planned installation depth and the number of lead and extension sections
 5. Preliminary helical configuration (number and diameter of helical bearing plates)
 6. Manufacturer's recommended capacity to installation torque ratio
 7. Minimum final installation torque(s)
 8. Product identification numbers and designations for all Bracket Assemblies and number and size of connection bolts or concrete reinforcing steel detail
 9. Corrosion protection coating on Helical Piles, Helical Anchors, and Bracket Assemblies
- B. Contractor's Pile Design Professional shall submit to the Engineer design calculations for the Helical Piles, Helical Anchors, and Brackets intended for use on the project at least 14 calendar days prior to planned start of installation. The Shop Drawings shall include the following:
1. Reduction in shaft dimension and strength by the sacrificial thickness anticipated based on corrosion loss over the design life for project soil conditions.
 2. Considerations for downdrag, buckling, and expansive soils (as appropriate).
 3. Minimum installation depth to reach bearing stratum and to achieve pullout capacity (if required).
 4. Soil bearing and pullout capacity.
 5. Lateral resistance of the shaft (if required).
 6. Estimated pile head movement at design loads.
- C. Contractor shall submit to the Engineer calibration information certified by an independent testing agency for the torque measurement device and all load testing and monitoring equipment to be used on the project. Calibration information shall have been tested within the last year of the date submitted. Calibration information shall include, but is not limited to, the name of the testing agency, identification number or serial number of device calibrated, and the date of calibration.
- D. If load tests or proof load tests are required on the Drawings, the Contractor shall submit for review and acceptance the proposed load testing procedure. The proposal shall provide the minimum following information:
1. Type and sensitivity of load equipment
 2. Type and sensitivity of load measuring equipment
 3. Type and sensitivity of pile-head deflection equipment
 4. General description of load reaction system, including description of reaction anchors or bearing plate
 5. Calibration reports for equipment, including hydraulic jack, pressure gauges, and deflection dial gauges
- E. Manufacturer shall provide a one year warranty against manufacturing defects on Helical Pile, Helical Anchor, and Bracket products. Any additional warranty provided by the Contractor shall be issued as an addendum to this specification.
- F. Work shall not begin until all the submittals have been received and approved by the Engineer. The Contractor shall allow the Engineer a reasonable number of days to review, comment, and return the submittal package after a complete set has been received. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.
- 1.6 Shipping, Storage, and Handling

- A. All Helical Pile, Helical Anchor, and Bracket Assemblies shall be free of structural defects and protected from damage. Store Helical Piles, Helical Anchors, and Bracket Assemblies on wood pallets or supports to keep from contacting the ground. Damage to materials shall be cause for rejection.

PART 2 PRODUCTS

2.1 Helical Piles, Helical Anchors, and Brackets

- A. Unless noted otherwise, it is the Contractor's Pile Design Professional's responsibility to select the appropriate size and type of Helical Piles, Helical Anchors, and Brackets to support the design loads shown on the Drawings. These specifications and the Drawings provide minimum requirements to aid the Contractor in making appropriate materials selections. The size and number of helical bearing plates must be such that the Helical Piles and Helical Anchors achieve the appropriate torque and capacity in the soils at the site within the minimum and maximum length requirements. Failure to achieve proper torque and capacity shall result in Contractor replacing Helical Piles and Helical Anchors as appropriate to support the required loads. All material replacements shall be acceptable to Engineer.
- B. The design strength of the helical bearing plates, shaft connections, Brackets, and the pile shaft itself shall be sufficient to support the design loads specified on the Drawings times appropriate service load factors. In addition, all Helical Piles and Helical Anchors shall be manufactured to the following criteria.
1. Central Shaft: The central shaft shall consist of a high strength structural steel tube meeting the requirements of ASTM A513.
 2. Helical Bearing Plates: One or more helical bearing plates shall be affixed to the central shaft. Helical bearing plates shall be attached to central shafts via fillet welds continuous on top and bottom and around the leading edges. Helical bearing plates shall be cold pressed into a near perfect helical shape that when affixed to the central shaft are perpendicular with the central shaft, of uniform pitch, and such that the leading and trailing edges are within 3/8 inch of parallel. Average helical pitch shall be within plus or minus 1/4 inch of the thickness of the helical bearing plate plus 3 inches.
 3. Corrosion Protection: Depending on project requirements and soil corrosivity, Helical Piles, Helical Anchors, and Brackets shall be bare steel, powder coated, or hot-dip galvanized (per ASTM A123 or A153 as applicable).
 4. Shaft Connections: The Helical Pile and Helical Anchor shaft connections shall consist of an external sleeve connection or a welded connection. External sleeve connections shall be in-line, straight and rigid and shall have a maximum tolerable slack of 1/16-inch. Welded connections shall consist of a full penetration groove weld all-around the central shaft. Shaft connections shall have a flexural strength at least as great as the shaft itself.
 5. Bolts: Bolt holes through the external sleeve and central shaft shall have a diameter that is 1/16th inch greater than the bolt diameter. Bolts and nuts used to join Helical Pile and Helical Anchor sections at the shaft connections shall be bare steel, epoxy coated, or zinc coated to match the corrosion protection used for the central shaft. All Helical Pile and Helical Anchor bolts shall be securely snug tightened.
 6. Plug Welds: Alternatively, external sleeve connections may be made using plug welds matching the diameter and number of bolt holes.

7. External sleeve: External sleeve Helical Pile and Helical Anchor shaft connections shall consist of a high strength structural steel tube outer sleeve meeting the requirements of ASTM A513. The outer sleeve shall be welded to the central shaft via a continuous fillet weld all-around. The fillet weld shall have a throat thickness equal to the external sleeve tube thickness.
- C. Helical Piles and Helical Anchors shall be fitted with a manufactured Bracket that facilitates connection to the structure. Brackets shall be rated for the design loads shown on the Drawings. Brackets shall be affixed to the end of Helical Piles and Helical Anchors via bolts, plug welds, or continuous penetration welds meeting the requirements for shaft connections given previously in these specifications.

PART 3 EXECUTION

3.1 Examination

- A. Contractor shall take reasonable effort to locate all utilities and structures above and underground in the area of the Work. Contractor shall pot hole to determine the exact location of underground utilities and buried structures within a distance from a Helical Pile or Helical Anchor equal to three times the maximum helix diameter. Contractor is responsible for protection of utilities and structures shown on the Drawings. Costs of avoiding, relocating, or repair of utilities not shown on Drawings shall be paid by Owner as extra work.
- B. Contractor shall review Drawings and soil borings in the Contract Documents to determine subsurface conditions for sizing and installation of Helical Piles and Helical Anchors. In addition, Contractor shall make a site visit to observe conditions prior to the start of Work.
- C. Contractor shall notify Engineer of any condition that would affect proper installation of Helical Piles and Helical Anchors immediately after the condition is revealed. Contractor shall halt installation work until the matter can be resolved upon mutual satisfaction of Contractor, Owner, and Engineer. Costs associated with construction delays, product substitutions, pile or anchor relocations, or other related costs shall be the responsibility of the Owner if the result of an unforeseen condition that could not be inferred by a reasonable Contractor from the Drawings and Construction Documents.
- D. If the number and size of helical bearing plates required for the project is not shown on the working drawings, the contractor shall have the option of performing subsurface tests using methods subject to the review and acceptance of the Owner. The data collected along with other information pertinent to the project site shall be used to determine the required helical bearing plate configuration.
- E. If excavation is required for proper installation of Helical Piles and Helical Anchors, Contractor shall make safe excavations in accordance with OSHA standards. All excavations greater than 20 feet in depth or not in strict accordance with OSHA standard details shall be designed by a registered design professional specializing in the design of excavations and shoring. The costs of all excavations, shoring, and related design shall be born by the Contractor unless noted otherwise in the Contract. Contractor shall notify Engineer at least 24 hours prior to installation of Helical Piles or Helical Anchors to schedule quality assurance observations required on the Drawings.

3.2 Installation Equipment

- A. Torque Motor: Helical Piles and Helical Anchors should be installed with high torque, low RPM torque motors, which allow the helical plates to advance with minimal soil disturbance. The torque motor shall be hydraulic power driven with clockwise and counter-clockwise rotation capability. The torque motor shall be adjustable with respect to revolutions per minute during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity equal to or greater than the minimum final installation torque required for the project. The connection between the torque motor and the installation rig shall have no more than two pivot hinges oriented 90 degrees from each other. Additional hinges promote wobbling and affect lateral capacity.
- B. Installation Equipment: The installation equipment shall be capable of applying adequate crowd and torque simultaneously to ensure normal advancement of the Helical Piles and Helical Anchors. The equipment shall be capable of maintaining proper alignment and position.
- C. Drive Tool: The connection between the torque motor and Helical Pile and Helical Anchor shall be in-line, straight, and rigid, and shall consist of a hexagonal, square, or round kelly bar adapter and helical shaft socket. To ensure proper fit, the drive tool shall be manufactured by the Helical Pile manufacturer and used in accordance with the manufacturer's installation instructions.
- D. Connection Pins: The central shaft of the Helical Pile or Helical Anchor shall be attached to the drive tool by ASME SAE Grade 8 smooth tapered pins matching the number and diameter of the specified shaft connection bolts. The connection pins should be maintained in good condition and safe to operate at all times. The pins should be regularly inspected for wear and deformation. Pins should be replaced with identical pins when worn or damaged.
- E. Torque Indicator: A torque indicator shall be used to measure installation torque during installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling. The torque indicator shall be capable of torque measurements with a sensitivity of 500 ft-lb or less. Torque indicators shall have been calibrated within 1-year prior to start of Work. Torque indicators that are an integral part of the installation equipment shall be calibrated on-site. Torque indicators that are mounted in-line with the installation tooling shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be re-calibrated following any maintenance performed on the torque motor. Torque indicators shall be re-calibrated if, in the opinion of the Engineer, reasonable doubt exists as to the accuracy of the torque measurements.

3.3 Installation Procedures

- A. Unless shown on the Drawings, the number and size of helical blades shall be determined by the Contractor's Pile Design Professional in order to achieve the required torque and tensile/bearing capacity for the soil conditions at the site. The ratio of design load to the total area of the helical bearing plates shall not exceed the Allowable Bearing Capacity.
- B. Connect the lead section to the Torque Motor using the Drive Tool and Connection Pins. Position and align the Lead Section at the location and to the inclination shown on the Drawings and crowd the pilot point into the soil. Advance the Lead Section and continue to add Extension Sections to achieve the Termination Criteria. All sections shall be advanced into the soil in a smooth, continuous manner at a rate of rotation between 10 and 40 revolutions per minute. Snug tight all coupling bolts.
- C. Constant axial force (crowd) shall be applied while rotating Helical Piles and Helical Anchors

into the ground. The crowd applied shall be sufficient to ensure that the Helical Pile and Helical Anchor advances into the ground a distance equal to at least 80% of the blade pitch per revolution during normal advancement.

- D. The manufacturer's torsional strength rating of the Helical Pile or Helical Anchor shall not be exceeded during installation.
- E. Bolt hole elongation due to torsion of the shaft of a Helical Anchor at the drive tool shall be limited to $\frac{1}{4}$ inch. Helical Anchors with bolt hole damage exceeding this criterion shall be uninstalled, removed, and discarded.
- F. When the Termination Criteria of a Helical Pile or Helical Anchor is obtained, the Contractor shall adjust the elevation of the top end of the shaft to the elevation shown on the Drawings or as required. This adjustment may consist of cutting off the top of the shaft and drilling new holes to facilitate installation of Brackets to the orientation shown on the Drawings. Alternatively, installation may continue until the final elevation and orientation of the pre-drilled bolt holes are in alignment. Contractor shall not reverse the direction of torque and back-out the Helical Pile or Helical Anchor to obtain the final elevation.
- G. The Contractor shall install Brackets in accordance with Helical Pile manufacturer's details or as shown on the Drawings.
- H. All Helical Pile and Helical Anchor components including the shaft and Bracket shall be isolated from making a direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects since these contacts may alter corrosion rates.
- I. After installation, Helical Anchors shall be pre-tensioned if indicated on the Drawings.

3.4 Termination Criteria

- A. Helical Piles and Helical Anchors shall be advanced until all of the following criteria are satisfied.
 - 1. Axial capacity is verified by achieving the final installation torque as shown on the Drawings or as provided by the Pile Design Professional.
 - 2. Minimum depth is obtained. The minimum depth shall be as shown on the Drawings, that which corresponds to the planned bearing stratum, or the depth at which the final installation torque is measured, whichever is greater. In addition, Helical Anchors shall be advanced until the average torque over the last three (3) feet equals or exceeds the required final installation torque.
- B. If the torsional strength rating of the Helical Pile or Helical Anchor and/or the maximum torque of the installation equipment has been reached or Augering occurs prior to achieving the minimum depth required, the Contractor shall have the following options:
 - 1. Terminate the installation at the depth obtained subject to the review and acceptance of the Engineer and Owner.
 - 2. Remove the Helical Pile or Helical Anchor and install a new one with fewer and/or smaller diameter helical bearing plates or with dual cutting edge helical bearing plates. The new helical configuration shall be subject to review and acceptance of the Engineer and Owner.
 - 3. Remove the Helical Pile or Helical Anchor and pre-drill a 4-inch diameter pilot hole in the same location and reinstall the anchor/pile.
 - 4. If the obstruction is shallow, remove the Helical Pile or Helical Anchor and remove the obstruction by surface excavation. Backfill and compact the resulting excavation

- and reinstall the anchor/pile.
5. Remove the Helical Pile or Helical Anchor and relocate 1-foot to either side of the installation location subject to the review and acceptance of Engineer and Owner.
 6. Reverse the direction of torque, back-out the Helical Pile or Helical Anchor a distance of 1 to 2 feet and attempt to reinstall by decreasing crowd and Augering through the obstruction.
 7. Remove the Helical Pile or Helical Anchor and sever the uppermost helical bearing plate from the Lead Section if more than one helical bearing plate is in use, or reshape the helical bearing plates to create a special tapered edge by cutting with a band saw. Reinstall the anchor or pile with revised helical bearing plate configuration.

C. If the final installation torque is not achieved at the contract length, the Contractor shall have the following options:

1. Until the maximum depth is achieved (if any), install the Helical Pile or Helical Anchor deeper using additional Extension Sections.
2. Remove the Helical Pile or Helical Anchor and install a new one with additional and/or larger diameter helical bearing plates.
3. Decrease the rated load capacity of the Helical Pile or Helical Anchor and install additional Helical Piles or Helical Anchors. The rated capacity and additional unit location shall be subject to the review and acceptance of the Engineer and Owner.

3.5 Allowable Tolerances

- A. Helical Piles and Helical Anchors shall be installed as close to the specified installation and orientation angles as possible. Tolerance for departure from installation and orientation angles shall be +/- 5 degrees.
- B. Helical Piles, Helical Anchors, and Bracket Assemblies shall be installed at the locations and to the elevations shown on the Plans. Tolerances for Bracket Assembly placement shall be +/- 1 inch in both directions perpendicular to the shaft and +/- 1/4 inch in a direction parallel with the shaft unless otherwise specified.

3.6 Quality Assurance

- A. The Contractor shall provide the Engineer and Owner copies of installation records within 48 hours after each installation is completed. These installation records shall include, but are not limited to, the following information:
 1. Name of project and Contractor
 2. Name of Contractor's supervisor during installation
 3. Date and time of installation
 4. Name and model of installation equipment
 5. Type of torque indicator used
 6. Location of Helical Pile or Helical Anchor by grid location, diagram, or assigned identification number
 7. Type and configuration of Lead Section with length of shaft and number and size of helical bearing plates
 8. Type and configuration of Extension Sections with length and number and size of helical bearing plates, if any
 9. Installation duration and observations
 10. Total length installed
 11. Final elevation of top of shaft and cut-off length, if any
 12. Final plumbness or inclination of shaft

13. Installation torque at minimum three-foot depth intervals
14. Final installation torque
15. Comments pertaining to interruptions, obstructions, or other relevant information
16. Verified axial load capacity

B. Unless specified otherwise on the Drawings or by local codes, the Engineer, the Pile Design Professional, or an inspection agency accepted by the Engineer shall observe and document at least 10 percent of Helical Pile and Helical Anchor installations.

3.7 Load Testing

A. Helical Pile Compression Tests

1. Contractor shall perform the number of compression tests shown on the Drawings, if any
2. Compression tests shall be performed following the "quick test" procedure described in ASTM D1143 specifications
3. Load tests shall be observed and documented by the Engineer
4. Unless otherwise shown on the Drawings, the maximum test load shall be 200% of the allowable load shown on the Drawings
5. The locations of Helical Piles to be tested shall be determined by the Contractor, unless noted on the Drawings
6. Installation methods, procedures, equipment, products, and final installation torque shall be identical to the production Helical Piles to the extent practical except where otherwise approved by the Owner or Engineer
7. A load test shall be deemed acceptable provided the maximum test load is applied without Helical Pile failure and the deflection of the pile head at the design load is less than 1-inch unless noted otherwise on the Drawings. Failure is defined when continuous jacking is required to maintain the load.

B. Helical Anchor Tension Tests

1. Contractor shall perform the number of proof load tests shown on the Drawings, if any
2. Proof load tests shall be performed following the procedure described in ASTM D3689 specifications
3. Proof load tests shall be observed and documented by the Engineer
4. Unless otherwise shown on the Drawings, the maximum test load shall be 150% of the allowable load shown on the Drawings
5. The locations of Helical Anchors to be tested shall be determined by the Contractor, unless shown on the Drawings
6. Installation methods, procedures, equipment, products, and final installation torque shall be identical to the production anchors to the extent practical except where otherwise approved by the Owner or Engineer
7. A proof load test shall be deemed acceptable provided the maximum test load is applied without helical anchor failure. Failure is when continuous jacking is required to maintain the load.

C. Helical Pile Lateral Load Tests

1. Contractor shall perform the number of lateral load tests shown on the Drawings, if any
2. Lateral load tests shall be performed following the "free head" procedure described in ASTM D3966 specifications
3. Lateral load tests shall be observed and documented by the Engineer
4. Unless otherwise shown on the Drawings, the maximum test load shall be 200% of the

- allowable lateral load shown on the Drawings
5. The locations of test Helical Piles shall be determined by the Contractor, unless shown on the Drawings
 6. Installation methods, procedures, equipment, products, and final installation torque shall be identical to the production piles to the extent practical except where otherwise approved by the Owner or Engineer
 7. A lateral load test shall be deemed acceptable provided the lateral deflection of the pile head measured at the ground surface at the maximum test load is equal to or less than 1-inch.
- D. If a load test fails the forgoing acceptance criteria, the Contractor shall modify the Helical Pile or Helical Anchor design and/or installation methods and retest the modified pile or anchor, as directed by the Owner or Engineer. These modifications include, but are not limited to, de-rating the load capacity, modifying the installation methods and equipment, increasing the minimum final installation torque, changing the helical configuration, or changing the product (i.e., duty). Modifications that require changes to the structure shall have prior review and acceptance of the Owner. Any modifications of design or construction procedures, and any retesting required shall be at the Contractor's expense.
- E. The Contractor shall provide the Owner and Engineer copies of load test reports confirming configuration and construction details within 1 week after completion of the load tests. This written documentation will either confirm the load capacity as required on the working drawings or propose changes based upon the results of the tests. At a minimum, the documentation shall include:
1. Name of project and Contractor
 2. Date, time, and duration of test
 3. Location of test Helical Pile or Helical Anchor by grid location, diagram, or assigned identification number
 4. Test procedure (ASTM D1143, D3689, or D3966)
 5. List of any deviations from procedure
 6. Description of calibrated testing equipment and test set-up
 7. Type and configuration of Helical Pile or Helical Anchor including lead section, number and type of extension sections, and manufacturer's product identification numbers
 8. Load steps and duration of each load increment
 9. Cumulative pile-head movement at each load step
 10. Comments pertaining to test procedure, equipment adjustments, or other relevant information

END OF SECTION 316334

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DIVISION 32 - 49

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APPENDIX

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Fact Sheet #21: Recordkeeping Requirements under the Fair Labor Standards Act (FLSA)

This fact sheet provides a summary of the FLSA's recordkeeping regulations, [29 CFR Part 516](#).

Records To Be Kept By Employers

Highlights: The [FLSA](#) sets [minimum wage](#), [overtime pay](#), recordkeeping, and [youth employment standards](#) for employment subject to its provisions. Unless exempt, covered employees must be paid at least the [minimum wage](#) and not less than one and one-half times their regular rates of pay for [overtime](#) hours worked.

Posting: Employers must display an official poster outlining the provisions of the Act, available at no cost from local offices of the Wage and Hour Division and toll-free, by calling 1-866-4USWage (1-866-487-9243). This poster is also available electronically for downloading and printing at <http://www.dol.gov/osbp/sbrefa/poster/main.htm>.

What Records Are Required: Every covered employer must keep certain records for each non-exempt worker. The Act requires no particular form for the records, but does require that the records include certain identifying information about the employee and data about the hours worked and the wages earned. The law requires this information to be accurate. The following is a listing of the basic records that an employer must maintain:

1. Employee's full name and social security number.
2. Address, including zip code.
3. Birth date, if younger than 19.
4. Sex and occupation.
5. Time and day of week when employee's workweek begins.
6. Hours worked each day.
7. Total hours worked each workweek.
8. Basis on which employee's wages are paid (e.g., "\$9 per hour", "\$440 a week", "piecework")
9. Regular hourly pay rate.
10. Total daily or weekly straight-time earnings.
11. Total overtime earnings for the workweek.
12. All additions to or deductions from the employee's wages.
13. Total wages paid each pay period.
14. Date of payment and the pay period covered by the payment.

How Long Should Records Be Retained: Each employer shall preserve for at least three years payroll records, collective bargaining agreements, sales and purchase records. Records on which wage computations are based should be retained for two years, i.e., time cards and piece work tickets, wage rate tables, work and time schedules, and records of additions to or deductions from wages. These records must be open for inspection by the Division's representatives, who may ask the employer to make extensions, computations, or transcriptions. The records may be kept at the place of employment or in a central records office.

What About Timekeeping: Employers may use any timekeeping method they choose. For example, they may use a time clock, have a timekeeper keep track of employee's work hours, or tell their workers to write their own times on the records. Any timekeeping plan is acceptable as long as it is complete and accurate.

The following is a sample timekeeping format employers may follow but are not required to do so:

DAY	DATE	IN	OUT	TOTAL HOURS
Sunday	6/3/07	-----	-----	-----
Monday	6/4/07	8:00am	12:02pm	
		1:00pm	5:03pm	8
Tuesday	6/5/07	7:57am	11:58am	
		1:00pm	5:00pm	8
Wednesday	6/6/07	8:02am	12:10pm	
		1:06pm	5:05pm	8
Thursday	6/7/07	-----	-----	-----
Friday	6/8/07	-----	-----	-----
Saturday	6/9/07	-----	-----	-----
Total Workweek Hours:				24

Employees on Fixed Schedules: Many employees work on a fixed schedule from which they seldom vary. The employer may keep a record showing the exact schedule of daily and weekly hours and merely indicate that the worker did follow the schedule. When a worker is on a job for a longer or shorter period of time than the schedule shows, the employer must record the number of hours the worker actually worked, on an exception basis.

Where to Obtain Additional Information

For additional information, visit our Wage and Hour Division Website: <http://www.wagehour.dol.gov> and/or call our toll-free information and helpline, available 8 a.m. to 5 p.m. in your time zone, 1-866-4USWAGE (1-866-487-9243).

This publication is for general information and is not to be considered in the same light as official statements of position contained in the regulations.

U.S. Department of Labor
 Frances Perkins Building
 200 Constitution Avenue, NW
 Washington, DC 20210

1-866-4-USWAGE
 TTY: 1-866-487-9243
[Contact Us](#)

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December 3, 2021

Mr. Marvin Hawkins
Sunflower County Consolidated School District
197 Martin Luther King Drive
Indianola, MS 38751

Re: Asbestos Inspection
Gentry High School, Carver Elementary School, Lockard Elementary School, R.L. Merritt Middle School, Ruleville Central Elementary, Ruleville Middle School, Thomas. E. Edwards High School, Drew Hunter Middle School, A.W. James Elementary School

Dear Mr. Hawkins:

You requested our services with respect to the presence of Asbestos-Containing Materials (ACMs) at the above-referenced properties in connection with the planned renovations upcoming at the Sunflower County Consolidated School District.

Following our site inspection and sample collection activities, no ACMs were detected in this inspection. This conclusion is based on the Environmental Protection Agency's (EPA) definition of an ACM as material composed of "...greater than 1% asbestos."

Gentry High School

Sample Name	Material Description	Analytical Results
GHS-16-01,02	HVAC Flashing (Main Building Roof)	8% Chrysotile
GHS-17-01,02	HVAC Flashing (Cafeteria Roof)	8% Chrysotile

Carver Elementary School

Sample Name	Material Description	Analytical Results
CES-16-01,02	HVAC Flashing (Central Wing Roof)	7% Chrysotile

Lockard Elementary School

Sample Name	Material Description	Analytical Results
LES-09-01,02	Textured Ceiling (North Wing Corridor)	3% Chrysotile

R.L. Merritt Middle School

No positive asbestos samples.

Mr. Marvin Hawkins

November 17, 2021

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Ruleville Central Elementary

Sample Name	Material Description	Analytical Results
RCE-02-01,02	Pipe fittings mud insulation (Main Bldg)	60% Chrysotile

Ruleville Middle School

Sample Name	Material Description	Analytical Results
RMS-03-01,02	Pipe fittings mud insulation (Main Bldg)	20% Chrysotile
RMS-04-01,02	Boiler interior insulation (Main Bldg)	4% Chrysotile

Thomas E. Edwards High School

No positive asbestos samples.

Drew Hunter Middle School

Sample Name	Material Description	Analytical Results
DHMS-07-01,02	Window Caulk (East of entrance)	3% Chrysotile

A.W. James Elementary School

No positive asbestos samples.

Please find attached a report of findings from the inspections. Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,
PICKERING FIRM, INC.



Willie Nester, P.E.
Associate Principal Owner



Andrew Wilson
Environmental Engineer Intern

Attachments

**ASBESTOS CONTAINING MATERIAL SURVEY
SUNFLOWER COUNTY CONSOLIDATED SCHOOL DISTRICT
INDIANOLA, MISSISSIPPI**



Sunflower
COUNTY CSD
#WINNING

**PREPARED FOR:
SUNFLOWER COUNTY CONSOLIDATED SCHOOL DISTRICT
196 MARTIN LUTHER KING DRIVE
INDIANOLA, MS 39074**

PREPARED BY:

**PICKERING FIRM, INC.
2001 AIRPORT ROAD, SUITE 201
FLOWOOD, MISSISSIPPI 38751**



**December 3, 2021
PICKERING PROJECT NO.: 26087.00**

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2.0 FINDINGS – ASBESTOS

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1.0 EXECUTIVE SUMMARY

This Asbestos-Containing Material (ACM) survey and assessment was performed to identify and assess the condition of suspect building materials and to provide recommended response actions based on the conditions of these materials. This report describes the survey tasks performed and presents our findings and recommendations. This survey was limited to the materials that may be affected by the upcoming HVAC renovations.

Prior to the initial inspection of the facility, special precautions and security/access requirements were coordinated with Mr. Marvin Hawkins at Sunflower County School District. At the time of the inspection, areas of the renovation were accessible.

During our inspection, the renovation areas of the building related to the project were visually inspected and the locations of suspected ACMs were noted. After all suspect ACMs were identified, a minimum of two (2) samples were collected of each homogeneous material. These suspect asbestos samples were subsequently labeled then submitted to an accredited laboratory for asbestos analysis by Polarized Light Microscopy (PLM). Laboratory analysis revealed eight (8) asbestos materials as ACM.

2.0 FINDINGS - ASBESTOS

During the asbestos survey, a total of one hundred sixty-six (166) bulk material samples were collected from thirty-seven (37) different homogeneous materials and analyzed for asbestos content. According to the analytical results, eight (8) materials were identified to contain asbestos. This conclusion is based on the Environmental Protection Agency (EPA) definition of an ACM as a material composed of "...greater than 1% asbestos."

MATERIALS THAT CONTAIN GREATER THAN 1% ASBESTOS

Gentry High School

Sample Name	Material Description	Analytical Results
GHS-16-01,02	HVAC Flashing (Main building roof)	8% Chrysotile
GHS-17-01,02	HVAC Flashing (cafeteria roof)	8% Chrysotile

Carver Elementary School

Sample Name	Material Description	Analytical Results
CES-16-01,02	HVAC Flashing (Central Wing roof)	7% Chrysotile

Lockard Elementary School

Sample Name	Material Description	Analytical Results
LES-09-01,02	Textured Ceiling (North Wing corridor)	3% Chrysotile

R.L. Merritt Middle School

No positive asbestos samples.

Ruleville Central Elementary

Sample Name	Material Description	Analytical Results
RCE-02-01,02	Pipe fittings mud insulation (Main Bldg)	60% Chrysotile

Ruleville Middle School

Sample Name	Material Description	Analytical Results
RMS-03-01,02	Pipe fitting mud insulation (Main Bldg)	20% Chrysotile
RMS-04-01,02	Boiler interior insulation (Main Bldg)	4% Chrysotile

Thomas E. Edwards High School

No positive asbestos samples.

Drew Hunter Middle School

Sample Name	Material Description	Analytical Results
DHMS-07-01,02	Window Caulk (East of entrance)	3% Chrysotile

A.W. James Elementary School

No positive asbestos samples.

NON-ASBESTOS MATERIALS SAMPLED

Sample analyses indicated that no asbestos was detected in the following materials:

Gentry High School

Material (Homogeneous Area No)

- 2x2 irregular hole ceiling tile (Office) (GHS-01)
- 2x2 irregular hole ceiling tile (Main Bldg) (GHS-02)
- Restroom Caulk (Main Bldg) (GHS-03)
- 2x2 wormhole ceiling tile (Library) (GHS-04)
- Plaster ceiling (Main Bldg) (GHS-05)
- 2x4 eroded pattern ceiling tile (Office) (GHS-06)
- 2x2 wormhole ceiling tile (Gym) (GHS-07)
- 2x2 irregular hole ceiling tile (Gym) (GHS-08)
- Restroom caulk (Gym) (GHS-09)
- 2x2 irregular hole ceiling tile (Ag Building) (GHS-10)
- 2x2 small irregular hole ceiling tile (New Wing) (GHS-11)
- 2x2 irregular hole ceiling tile (New Wing) (GHS-12)
- Restroom caulk (New wing) (GHS-13)
- 2x2 irregular hole ceiling tile (Band Hall) (GHS-14)
- 2x2 wormhole ceiling tile (Band Hall) (GHS-15)

Carver Elementary School

Material (Homogeneous Area No)

- 2x2 irregular hole ceiling tile (Office) (CES-01)
- 2x2 large hole ceiling tile (Office) (CES-02)
- 2x4 ceiling tile (Auditorium) (CES-03)
- 1x1 ceiling tile (Auditorium) (CES-04)
- 2x2 irregular hole ceiling tile (Lower Elementary) (CES-05)
- Restroom Caulk (Lower Elementary) (CES-06)
- 2x2 irregular pattern ceiling tile (Cafeteria) (CES-07)
- 2x2 irregular pattern ceiling tile (West Wing) (CES-08)
- Restroom Caulk (West Wing) (CES-09)
- 2x2 small hole ceiling tile (Middle Wing) (CES-10)
- Restroom Caulk (Middle Wing) (CES-11)

- 2x2 wormhole ceiling tile (East Wing) (CES-12)
- Restroom Caulk (East Wing) (CES-13)
- 2x2 ceiling tile (Gym) (CES-14)
- HVAC Flashing (East Wing) (CES-15)
- HVAC Flashing (West Wing) (CES-17)

Lockard Elementary School

Material (Homogeneous Area No)

- Textured Ceiling (Office) (LES-01)
- 2x2 small wormhole ceiling tile (Office) (LES-02)
- Textured Ceiling (Gym Lobby) (LES-03)
- 2x2 small wormhole ceiling tile (South Wing) (LES-04)
- Plaster above ceiling tile (South Wing) (LES-05)
- 2x2 small wormhole ceiling tile (Middle Wing) (LES-06)
- 2x2 small wormhole ceiling tile (Cafeteria) (LES-07)
- 2x2 small wormhole ceiling tile (North Wing) (LES-08)
- HVAC Flashing (Cafeteria) (LES-10)
- HVAC Flashing (Gym) (LES-11)

R.L. Merritt Middle School

Material (Homogeneous Area No)

- 2x2 small wormhole ceiling tile (RLM-01)
- Restroom caulk (RLM-02)

Ruleville Central Elementary

Material (Homogeneous Area No)

- Sheetrock 2x2 ceiling tile (Main Bldg) (RCE-01)
- 1x1 ceiling tile (North Bldg) (RCE-03)
- 2x2 panel ceiling tile (North Bldg) (RCE-04)
- 2x2 panel ceiling tile (West Bldg) (RCE-05)

Ruleville Middle School

Material (Homogeneous Area No)

- 2x2 irregular hole ceiling tile (Main Bldg) (RMS-01)
- 2x2 Spot ceiling tile (Teachers' Lounge) (RMS-02)
- 2x2 panel ceiling tile (Main Bldg) (RMS-05)
- Restroom caulk (Main Bldg) (RMS-06)
- Textured Ceiling (Cafeteria) (RMS-07)
- A/C Caulk (RMS-08)
- Window Putty (RMS-09)
- Window Caulk (RMS-10)

Thomas E. Edwards High School
Material (Homogeneous Area No)

- 2x4 wormhole ceiling tile (Main Bldg) (TEE-01)
- 2x2 sheetrock ceiling tile (Main Bldg) (TEE-02)
- 2x4 wormhole ceiling tile (TEE-03)
- Sheetrock ceiling and textured ceiling (TEE-04)
- A/C Caulk (TEE-05)
- 2x4 irregular pattern ceiling tile (TEE-06)
- 2x4 wormhole ceiling tile (TEE-07)
- HVAC Flashing (TEE-08)

Drew Hunter Middle School
Material (Homogeneous Area No)

- 2x4 wormhole ceiling tile (Main Bldg) (DHMS-01)
- 1x1 ceiling tile (Main Bldg) (DHMS-02)
- 2x2 wormhole ceiling tile (DHMS-03)
- 2x2 bird shot ceiling tile (DHMS-04)
- 2x2 wormhole ceiling tile (DHMS-05)
- Pipe elbow mud insulation (DHMS-06)
- Window Putty (East side of entrance) (DHMS-08)
- Window Caulk (West side of entrance) (DHMS-09)

A.W. James Elementary School
Material (Homogeneous Area No)

- 2x4 irregular hole ceiling tile (Main Bldg) (AWJ-01)
- Pipe mud insulation (Main Bldg) (AWJ-02)
- Window Stucco (AWJ-03)
- Window Caulk (AWJ-04)

3.0 RECOMMENDATIONS

Asbestos

Considering these findings, NESHAP Regulations 40 CFR 61, Subpart M, requires the removal of ACM before any renovation or demolition takes place that will disturb those materials and render them friable. Therefore, any future expansion, demolition, or renovation activities at the facility that would impact any of the ACMs should follow the NESHAP regulations. A renovation project of this type may also require a written notification to be submitted to the Mississippi Department of Environmental Quality (MDEQ) ten (10) days prior to the beginning of the project.

4.0 COST ESTIMATE

			Removal	
Location	Material	Quantity*	Unit Cost	Total Cost*
Gentry High School	HVAC Flashing	500 sq ft	\$5.00/sf	\$2,500.00
Carver Elementary School	HVAC Flashing (Middle Wing)	350 sq ft	\$5.00/sf	\$1,750.00
Lockard Elementary School	Textured Ceiling	6,000 sq ft	\$5.00/sq' ft	\$30,000.00
Ruleville Central Elementary	Pipe Mud Insulation	15 lf	20.00/lf	\$300.00
Ruleville Middle School	Pipe Mud Insulation	50 lf	20.00/lf	\$1,000.00
Ruleville Middle School	Boiler Interior Insulation	1 boiler	\$2500.00 per boiler	\$2,500.00
Drew Hunter Middle School	Window Caulk (East side of entrance)	300 lf	\$5.00/lf	\$1500.00
Abatement Total				\$39,550.00

*Note: These quantities and cost estimates are for planning purposes only and are not to be used for bidding/quoting purposes. Contractors shall obtain their own estimates before bidding.

APPENDICES

APPENDIX A
LABORATORY ANALYSIS REPORTS

ASBESTOS RESULTS



EMSL Analytical, Inc.

3303 PARKWAY CENTER COURT Orlando, FL 32808

Tel/Fax: (407) 599-5887 / (407) 599-9063

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

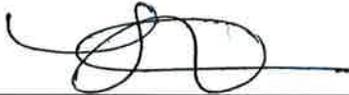
EMSL Order: 342119825
Customer ID: POWE54
Customer PO:
Project ID:

Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 11/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date: 11/04/2021
Project: 26087.00 Sunflower Co. ESSER Inspections A.W. James Elementary School	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
AWJ-01-01 <small>342119825-0001</small>		Gray/White Fibrous Heterogeneous	40% Cellulose 35% Min. Wool	20% Perlite 5% Non-fibrous (Other)	None Detected
AWJ-01-02 <small>342119825-0002</small>		Gray/White Fibrous Heterogeneous	40% Cellulose 35% Min. Wool	20% Perlite 5% Non-fibrous (Other)	None Detected
AWJ-02-01-Insulation <small>342119825-0003</small>		Tan Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected
AWJ-02-01-Mud <small>342119825-0003A</small>		Gray Fibrous Heterogeneous	65% Min. Wool	15% Ca Carbonate 20% Non-fibrous (Other)	None Detected
AWJ-02-02-Insulation <small>342119825-0004</small>		Tan Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected
AWJ-02-02-Mud <small>342119825-0004A</small>		Gray Fibrous Heterogeneous	65% Min. Wool	15% Ca Carbonate 20% Non-fibrous (Other)	None Detected
AWJ-03-01 <small>342119825-0005</small>		Brown/Gray Non-Fibrous Homogeneous	4% Glass	30% Quartz 15% Ca Carbonate 51% Non-fibrous (Other)	None Detected
AWJ-03-02 <small>342119825-0006</small>		Gray Non-Fibrous Homogeneous	4% Glass	30% Quartz 15% Ca Carbonate 51% Non-fibrous (Other)	None Detected
AWJ-04-01 <small>342119825-0007</small>		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
AWJ-04-02 <small>342119825-0008</small>		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)
Nashira McCall (10)



Jessicka Lopez, Asbestos Lab Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

Initial report from: 11/11/2021 10:59:27



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EMSL Order: 342119861
Customer ID: POWE54
Customer PO:
Project ID:

Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 11/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date:
Project: 26087.00 Synflower Co. ESSER Inspections Carver Elementary School	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
CES-01-01 342119861-0001		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-01-02 342119861-0002		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-02-01 342119861-0003		Tan/White Fibrous Heterogeneous	10% Cellulose	65% Gypsum 25% Non-fibrous (Other)	None Detected
CES-02-02 342119861-0004		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-03-01 342119861-0005		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-03-02 342119861-0006		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-04-01 342119861-0007		Tan/White Fibrous Homogeneous	80% Cellulose	20% Non-fibrous (Other)	None Detected
CES-04-02 342119861-0008		Brown/White Fibrous Heterogeneous	85% Cellulose	15% Non-fibrous (Other)	None Detected
CES-05-01 342119861-0009		Tan/White Fibrous Heterogeneous	10% Cellulose 30% Min. Wool	20% Perlite 40% Non-fibrous (Other)	None Detected
CES-05-02 342119861-0010		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-06-01 342119861-0011		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-06-02 342119861-0012		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-07-01 342119861-0013		Tan Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-07-02 342119861-0014		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-08-01 342119861-0015		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-08-02 342119861-0016		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected

Initial report from: 11/11/2021 11:23:53



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EMSL Order: 342119861
Customer ID: POWE54
Customer PO:
Project ID:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos % Type
			% Fibrous	% Non-Fibrous	
CES-09-01 342119861-0017		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-09-02 342119861-0018		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-10-01 342119861-0019		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-10-02 342119861-0020		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-11-01 342119861-0021		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-11-02 342119861-0022		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-12-01 342119861-0023		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-12-02 342119861-0024		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-13-01 342119861-0025		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-13-02 342119861-0026		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-14-01 342119861-0027		Tan Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
CES-14-02 342119861-0028		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
CES-15-01 342119861-0029		Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
CES-15-02 342119861-0030		Black/Silver Fibrous Heterogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
CES-16-01 342119861-0031		Gray/White Non-Fibrous Homogeneous	15% Synthetic	85% Non-fibrous (Other)	None Detected
CES-16-02 342119861-0032		Black Fibrous Heterogeneous	5% Glass	88% Non-fibrous (Other)	7% Chrysotile
CES-17-01 342119861-0033		Black Non-Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
CES-17-02 342119861-0034		Black Fibrous Homogeneous	25% Glass	75% Non-fibrous (Other)	None Detected

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EMSL Order: 342119861

Customer ID: POWE54

Customer PO:

Project ID:

Analyst(s)

Jessicka Lopez (15)

Laura Vera (19)

Jessicka Lopez, Asbestos Lab Manager
or Other Approved Signatory

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EMSL Order: 342119789
Customer ID: POWE54
Customer PO:
Project ID:

Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 01/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date: 11/04/2021
Project: 26087.00 Sunflower Co. ESSER Inspections Drew Hunter Middle School	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
DHMS-01-01 342119789-0001		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-01-02 342119789-0002		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-02-01 342119789-0003		Brown/White Fibrous Heterogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected
DHMS-02-02 342119789-0004		Brown/White Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected
DHMS-03-01 342119789-0005		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-03-02 342119789-0006		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-04-01 342119789-0007		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-04-02 342119789-0008		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-05-01 342119789-0009		Brown/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-05-02 342119789-0010		Brown/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
DHMS-06-01 342119789-0011		Gray Fibrous Homogeneous	65% Min. Wool	15% Ca Carbonate 20% Non-fibrous (Other)	None Detected
DHMS-06-02 342119789-0012		Gray Fibrous Homogeneous	65% Min. Wool	15% Ca Carbonate 20% Non-fibrous (Other)	None Detected
DHMS-07-01 342119789-0013		Gray/Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
DHMS-07-02 342119789-0014		Gray/Tan Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
DHMS-08-01 342119789-0015		Gray Non-Fibrous Homogeneous		10% Quartz 15% Ca Carbonate 75% Non-fibrous (Other)	None Detected
DHMS-08-02-Putty 342119789-0016		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 11/11/2021 11:02:10



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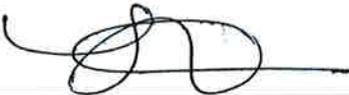
Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
DHMS-08-02-Glazing 342119789-0016A		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	<1% Chrysotile
DHMS-09-01 342119789-0017		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
DHMS-09-02 342119789-0018		Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

Bryan Lopez-Duenas (10)

Nashira McCall (9)



 Jessicka Lopez, Asbestos Lab Manager
 or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

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EMSL Order: 342119855

Customer ID: POWE54

Customer PO: 17243

Project ID:

Attention: Andrew Wilson

Pickering Firm, Inc.

6363 Poplar Avenue

Suite 300

Memphis, TN 38119

Project: 26087 Synflower Co. ESSER Inspections Gentry High School

Phone:

Fax: (601) 956-7817

Received Date: 11/09/2021 10:16 AM

Analysis Date: 11/11/2021

Collected Date:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
GHS-01-01 342119855-0001		Tan/White Fibrous Homogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-01-02 342119855-0002		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-02-01 342119855-0003		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-02-02 342119855-0004		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-03-01 342119855-0005		Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-03-02 342119855-0006		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-04-01 342119855-0007		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-04-02 342119855-0008		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-05-01 342119855-0009		White Non-Fibrous Homogeneous		30% Quartz 10% Ca Carbonate 60% Non-fibrous (Other)	None Detected
GHS-05-02-Skim Coat 342119855-0010		White Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	None Detected
GHS-05-02-Base Coat 342119855-0010A		Gray Non-Fibrous Homogeneous		15% Quartz 15% Ca Carbonate 70% Non-fibrous (Other)	None Detected
GHS-06-01 342119855-0011		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-06-02 342119855-0012		Tan Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-07-01 342119855-0013		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-07-02 342119855-0014		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	30% Non-fibrous (Other)	None Detected
GHS-08-01 342119855-0015		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected

Initial report from: 11/11/2021 11:58:54



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EMSL Order: 342119855
Customer ID: POWE54
Customer PO: 17243
Project ID:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
GHS-08-02 342119855-0016		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-09-01 342119855-0017		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-09-02 342119855-0018		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-10-01 342119855-0019		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-10-02 342119855-0020		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-11-01 342119855-0021		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-11-02 342119855-0022		Tan/White Non-Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-12-01 342119855-0023		Tan/White Fibrous Heterogeneous	40% Cellulose 35% Min. Wool	20% Perlite 5% Non-fibrous (Other)	None Detected
GHS-12-02 342119855-0024		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-13-01 342119855-0025		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-13-02 342119855-0026		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
GHS-14-01 342119855-0027		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-14-02 342119855-0028		Gray/White Fibrous Homogeneous	75% Min. Wool	25% Non-fibrous (Other)	None Detected
GHS-15-01 342119855-0029		Brown/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-15-02 342119855-0030		Tan Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
GHS-16-01 342119855-0031		Black Non-Fibrous Homogeneous	5% Synthetic 5% Glass	82% Non-fibrous (Other)	8% Chrysotile
GHS-16-02 342119855-0032		Gray/White Fibrous Homogeneous	10% Synthetic	90% Non-fibrous (Other)	None Detected
<i>The Sample Group is Not Homogeneous.</i>					
GHS-17-01 342119855-0033		Black Fibrous Homogeneous		92% Non-fibrous (Other)	8% Chrysotile

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EMSL Order: 342119855
 Customer ID: POWE54
 Customer PO: 17243
 Project ID:

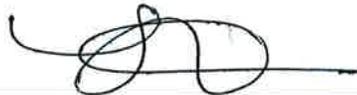
Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
GHS-17-02					Positive Stop (Not Analyzed)

342119855-0034

Analyst(s)

Laura Vera (17)
 Nashira McCall (17)



 Jessicka Lopez, Asbestos Lab Manager
 or Other Approved Signatory

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Tel/Fax: (407) 599-5887 / (407) 599-9063

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

EMSL Order: 342119831

Customer ID: POWE54

Customer PO: 17243

Project ID:

Attention: Andrew Wilson
Pickering Firm, Inc.
6363 Poplar Avenue
Suite 300
Memphis, TN 38119

Phone:

Fax: (601) 956-7817

Received Date: 11/09/2021 10:16 AM

Analysis Date: 11/11/2021

Collected Date:

Project: 26087.00 Sunflower Co. ESSER Inspections Lockard Elementary School

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

Sample	Description	Appearance	Non-Asbestos		Asbestos % Type
			% Fibrous	% Non-Fibrous	
LES-01-01-Texture <small>342119831-0001</small>		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
LES-01-01-Plaster <small>342119831-0001A</small>		Gray Non-Fibrous Homogeneous		15% Ca Carbonate 3% Mica 82% Non-fibrous (Other)	None Detected
LES-01-02-Texture <small>342119831-0002</small>		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
LES-01-02-Plaster <small>342119831-0002A</small>		Gray Non-Fibrous Homogeneous		15% Ca Carbonate 2% Mica 83% Non-fibrous (Other)	None Detected
LES-02-01 <small>342119831-0003</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-02-02 <small>342119831-0004</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-03-01-Texture <small>342119831-0005</small>		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
LES-03-01-Plaster <small>342119831-0005A</small>		Gray Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	None Detected
LES-03-02-Texture <small>342119831-0006</small>		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
LES-03-02-Plaster <small>342119831-0006A</small>		Gray Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	None Detected
LES-04-01 <small>342119831-0007</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-04-02 <small>342119831-0008</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-05-01 <small>342119831-0009</small>		Gray Non-Fibrous Homogeneous		15% Ca Carbonate 5% Mica 80% Non-fibrous (Other)	None Detected
LES-05-02 <small>342119831-0010</small>		Gray Non-Fibrous Homogeneous		25% Quartz 15% Ca Carbonate 5% Mica 55% Non-fibrous (Other)	None Detected
LES-06-01 <small>342119831-0011</small>		Tan/White Non-Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-06-02 <small>342119831-0012</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected

Initial report from: 11/11/2021 11:13:33



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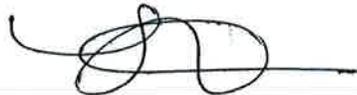
EMSL Order: 342119831
Customer ID: POWE54
Customer PO: 17243
Project ID:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
LES-07-01 342119831-0013		Gray/White Fibrous Homogeneous	75% Min. Wool	25% Non-fibrous (Other)	None Detected
LES-07-02 342119831-0014		Gray Fibrous Homogeneous	75% Min. Wool	25% Non-fibrous (Other)	None Detected
LES-08-01 342119831-0015		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-08-02 342119831-0016		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
LES-09-01 342119831-0017		White Non-Fibrous Homogeneous		15% Ca Carbonate 82% Non-fibrous (Other)	3% Chrysotile
LES-09-02 342119831-0018					Positive Stop (Not Analyzed)
LES-10-01 342119831-0019		Black Non-Fibrous Homogeneous	8% Cellulose	92% Non-fibrous (Other)	None Detected
LES-10-02 342119831-0020		Black Non-Fibrous Homogeneous	8% Cellulose	92% Non-fibrous (Other)	None Detected
LES-11-01 342119831-0021		Black Non-Fibrous Homogeneous	9% Cellulose	91% Non-fibrous (Other)	None Detected
LES-11-02 342119831-0022		Black Non-Fibrous Homogeneous	9% Cellulose	91% Non-fibrous (Other)	None Detected

Analyst(s)

Jason Stuhr (25)



 Jessicka Lopez, Asbestos Lab Manager
 or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

Initial report from: 11/11/2021 11:13:33



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EMSL Order: 342119821
Customer ID: POWE54
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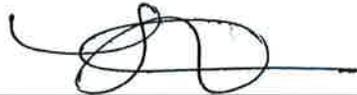
Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 11/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date:
Project: 26087.00 Sunflower Co. ESSER Inspections Robert L. Merritt Middle School	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RLM-01-01 <small>342119821-0001</small>		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
RLM-01-02 <small>342119821-0002</small>		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
RLM-02-01 <small>342119821-0003</small>		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RLM-02-02 <small>342119821-0004</small>		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

Nashira McCall (4)



Jessicka Lopez, Asbestos Lab Manager
or Other Approved Signatory

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EMSL Order: 342119807
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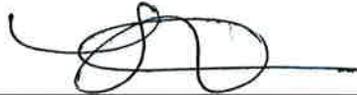
Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 11/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date:
Project: 26087.00 Sunflower Co. ESSER Inspections Ruleville Central Elementary	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RCE-01-01 <small>342119807-0001</small>		Brown/White Fibrous Heterogeneous	10% Cellulose <1% Glass	65% Gypsum <1% Mica 25% Non-fibrous (Other)	None Detected
RCE-01-02 <small>342119807-0002</small>		Brown/White Fibrous Heterogeneous	10% Cellulose <1% Glass	65% Gypsum <1% Mica 25% Non-fibrous (Other)	None Detected
RCE-02-01 <small>342119807-0003</small>		Gray Fibrous Homogeneous		40% Non-fibrous (Other)	60% Chrysotile
RCE-02-02 <small>342119807-0004</small>					Positive Stop (Not Analyzed)
RCE-03-01 <small>342119807-0005</small>		Tan/White Fibrous Homogeneous	85% Cellulose	15% Non-fibrous (Other)	None Detected
RCE-03-02 <small>342119807-0006</small>		Tan/White Fibrous Homogeneous	85% Cellulose	15% Non-fibrous (Other)	None Detected
RCE-04-01 <small>342119807-0007</small>		White Non-Fibrous Homogeneous	3% Glass	97% Non-fibrous (Other)	None Detected
RCE-04-02 <small>342119807-0008</small>		White Non-Fibrous Homogeneous	3% Glass	97% Non-fibrous (Other)	None Detected
RCE-05-01 <small>342119807-0009</small>		White Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
RCE-05-02 <small>342119807-0010</small>		White Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected

Analyst(s)

Jason Stuhr (9)



Jessicka Lopez, Asbestos Lab Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

Initial report from: 11/11/2021 11:20:05



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EMSL Order: 342119799
Customer ID: POWE54
Customer PO:
Project ID:

Attention: Andrew Wilson
 Pickering Firm, Inc.
 6363 Poplar Avenue
 Suite 300
 Memphis, TN 38119
Project: 26087.00 Sunflower Co. ESSER Inspections Ruleville Middle School

Phone:
Fax: (601) 956-7817
Received Date: 11/09/2021 10:16 AM
Analysis Date: 11/11/2021
Collected Date:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RMS-01-01 342119799-0001		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
RMS-01-02 342119799-0002		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
RMS-02-01 342119799-0003		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	10% Perlite 20% Non-fibrous (Other)	None Detected
RMS-02-02 342119799-0004		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
RMS-03-01 342119799-0005		Gray Fibrous Homogeneous	45% Cellulose	35% Non-fibrous (Other)	20% Chrysotile
RMS-03-02 342119799-0006					Positive Stop (Not Analyzed)
RMS-04-01 342119799-0007		Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RMS-04-02 342119799-0008		Tan Non-Fibrous Homogeneous		96% Non-fibrous (Other)	4% Chrysotile
RMS-05-01 342119799-0009		White Fibrous Heterogeneous	25% Glass	75% Non-fibrous (Other)	None Detected
RMS-05-02 342119799-0010		White Non-Fibrous Homogeneous	25% Glass	75% Non-fibrous (Other)	None Detected
RMS-06-01 342119799-0011		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RMS-06-02 342119799-0012		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RMS-07-01-Skim Coat 342119799-0013		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
RMS-07-01-Base Coat 342119799-0013A		Gray Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	<1% Chrysotile
RMS-07-02-Skim Coat 342119799-0014		White Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	None Detected
RMS-07-02-Base Coat 342119799-0014A		Gray Non-Fibrous Homogeneous		30% Quartz 15% Ca Carbonate 55% Non-fibrous (Other)	<1% Chrysotile

Initial report from: 11/11/2021 11:47:39



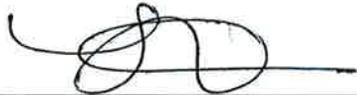
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EMSL Order: 342119799
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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
RMS-08-01 342119799-0015		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RMS-08-02 342119799-0016		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
RMS-09-01 342119799-0017		Gray Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	<1% Chrysotile
RMS-09-02 342119799-0018		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	<1% Chrysotile
RMS-10-01 342119799-0019		White Non-Fibrous Homogeneous	2% Wollastonite	15% Ca Carbonate 83% Non-fibrous (Other)	None Detected
RMS-10-02 342119799-0020		White Non-Fibrous Homogeneous	5% Wollastonite	15% Ca Carbonate 80% Non-fibrous (Other)	None Detected

Analyst(s)
 Bryan Lopez-Duenas (10)
 Jessicka Lopez (11)


 Jessicka Lopez, Asbestos Lab Manager
 or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

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EMSL Order: 342119827
Customer ID: POWE54
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Attention: Andrew Wilson Pickering Firm, Inc. 6363 Poplar Avenue Suite 300 Memphis, TN 38119	Phone: Fax: (601) 956-7817 Received Date: 11/09/2021 10:16 AM Analysis Date: 11/11/2021 Collected Date:
Project: 26087.00 Sunflower Co. ESSER Inspections Thomas E. Edwards High School	

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
TEE-01-01 <small>342119827-0001</small>		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-01-02 <small>342119827-0002</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-02-01 <small>342119827-0003</small>		White Fibrous Heterogeneous	8% Cellulose	65% Gypsum 4% Mica 23% Non-fibrous (Other)	None Detected
TEE-02-02 <small>342119827-0004</small>		Brown/White Non-Fibrous Homogeneous	10% Cellulose <1% Glass	65% Gypsum <1% Mica 25% Non-fibrous (Other)	None Detected
TEE-03-01 <small>342119827-0005</small>		Tan/White Fibrous Heterogeneous	30% Cellulose 40% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-03-02 <small>342119827-0006</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-04-01-Sheetrock <small>342119827-0007</small>		Brown/Tan Fibrous Heterogeneous	10% Cellulose <1% Glass	65% Gypsum 25% Non-fibrous (Other)	None Detected
TEE-04-01-Joint Compound <small>342119827-0007A</small>		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
TEE-04-02-Sheetrock <small>342119827-0008</small>		Brown/White Fibrous Heterogeneous	10% Cellulose <1% Glass	65% Gypsum 25% Non-fibrous (Other)	None Detected
TEE-04-02-Joint Compound <small>342119827-0008A</small>		White Non-Fibrous Homogeneous		15% Ca Carbonate 85% Non-fibrous (Other)	None Detected
TEE-05-01 <small>342119827-0009</small>		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
TEE-05-02 <small>342119827-0010</small>		White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
TEE-06-01 <small>342119827-0011</small>		Tan/White Fibrous Heterogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-06-02 <small>342119827-0012</small>		Tan/White Fibrous Homogeneous	40% Cellulose 30% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
TEE-07-01 <small>342119827-0013</small>		Brown/White Fibrous Heterogeneous	8% Cellulose <1% Glass	65% Gypsum 4% Mica 23% Non-fibrous (Other)	None Detected

Initial report from: 11/11/2021 11:46:11



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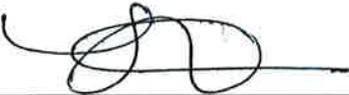
EMSL Order: 342119827
Customer ID: POWE54
Customer PO:
Project ID:

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

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
TEE-07-02 342119827-0014		Brown/White Fibrous Heterogeneous	10% Cellulose <1% Glass	65% Gypsum <1% Mica 25% Non-fibrous (Other)	None Detected
TEE-08-01 342119827-0015		Black Fibrous Heterogeneous	20% Cellulose 10% Synthetic	70% Non-fibrous (Other)	None Detected
TEE-08-02 342119827-0016		Black Fibrous Homogeneous	10% Cellulose 2% Synthetic	88% Non-fibrous (Other)	None Detected

Analyst(s)

 Jason Stuhr (9)
 Nashira McCall (9)



 Jessicka Lopez, Asbestos Lab Manager
 or Other Approved Signatory

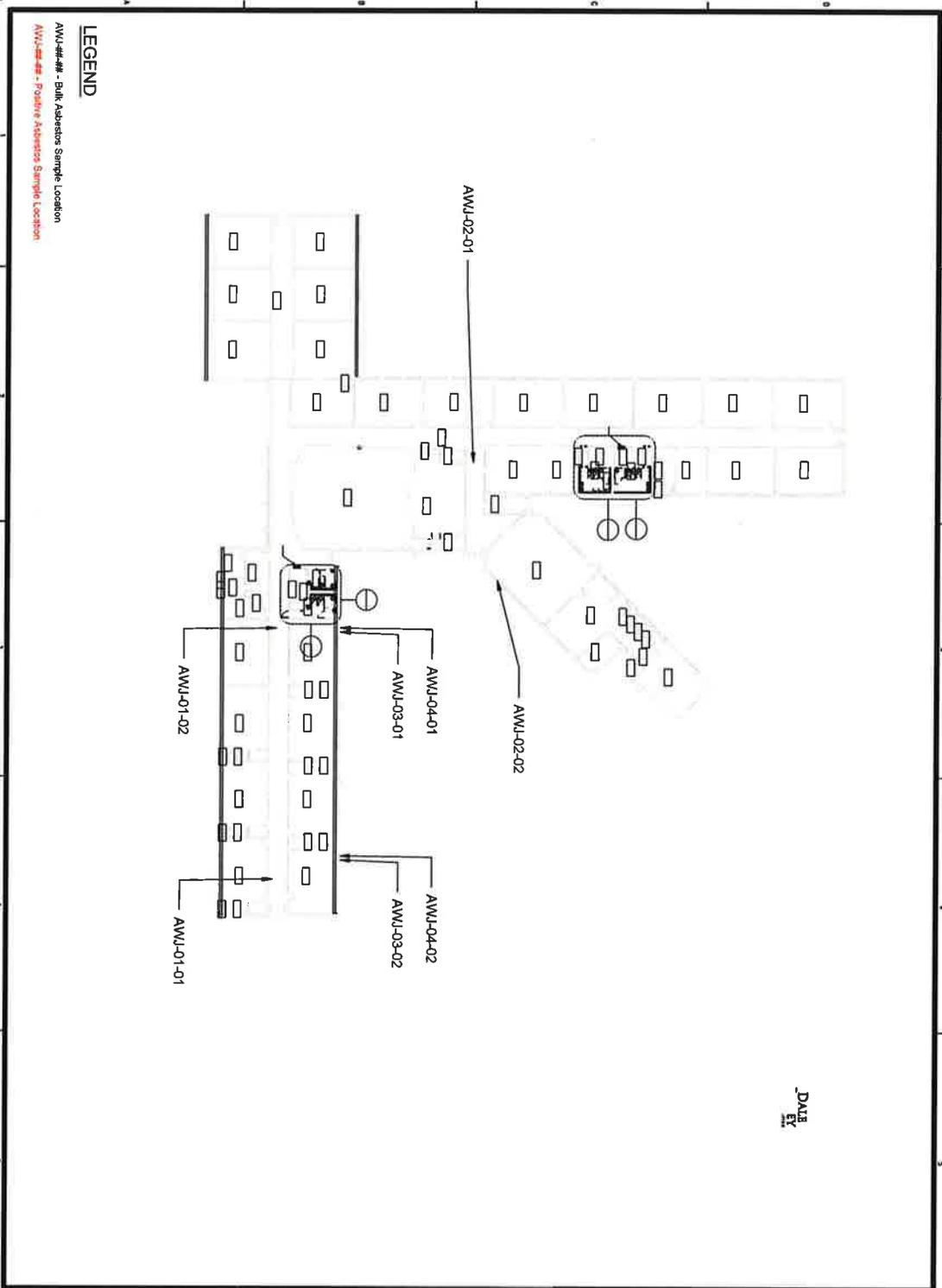
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Samples analyzed by EMSL Analytical, Inc. Orlando, FL NVLAP Lab Code 101151-0

Initial report from: 11/11/2021 11:46:11

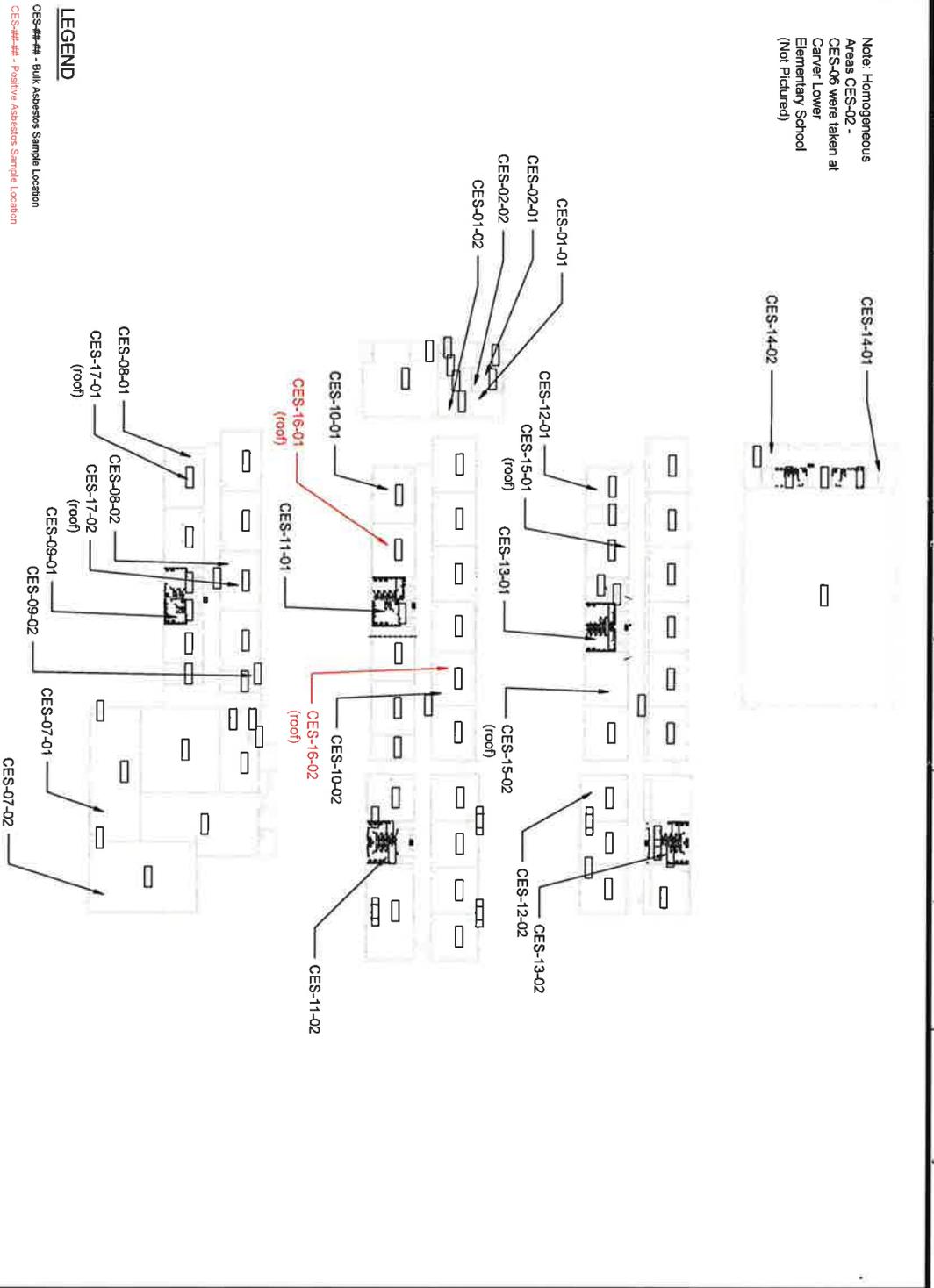
APPENDIX B
SAMPLE LOCATION MAPS

Sample Locations



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Note: Homogeneous Areas CES-02 - CES-06 were taken at Carver Lower Elementary School (Not Pictured)



LEGEND

CES-###-## - Bulk Asbestos Sample Location
 CES-###-## - Positive Asbestos Sample Location

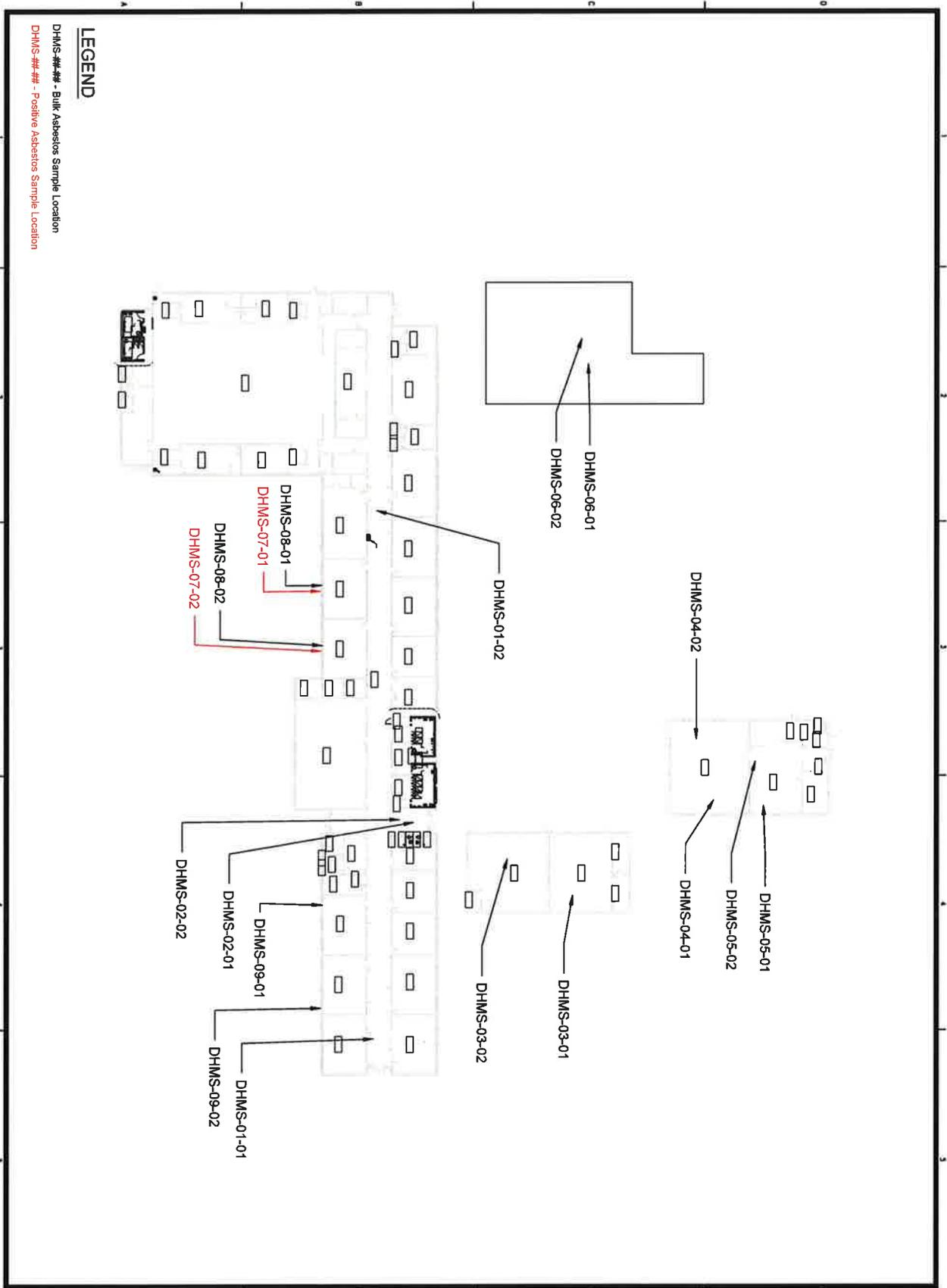
PROJECT # 2009-100
 DATE October 2011
 DRAWN BY
 CHECKED BY



Carver Elementary School
 Sunflower County Consolidated School District
 Indianola, Mississippi

2

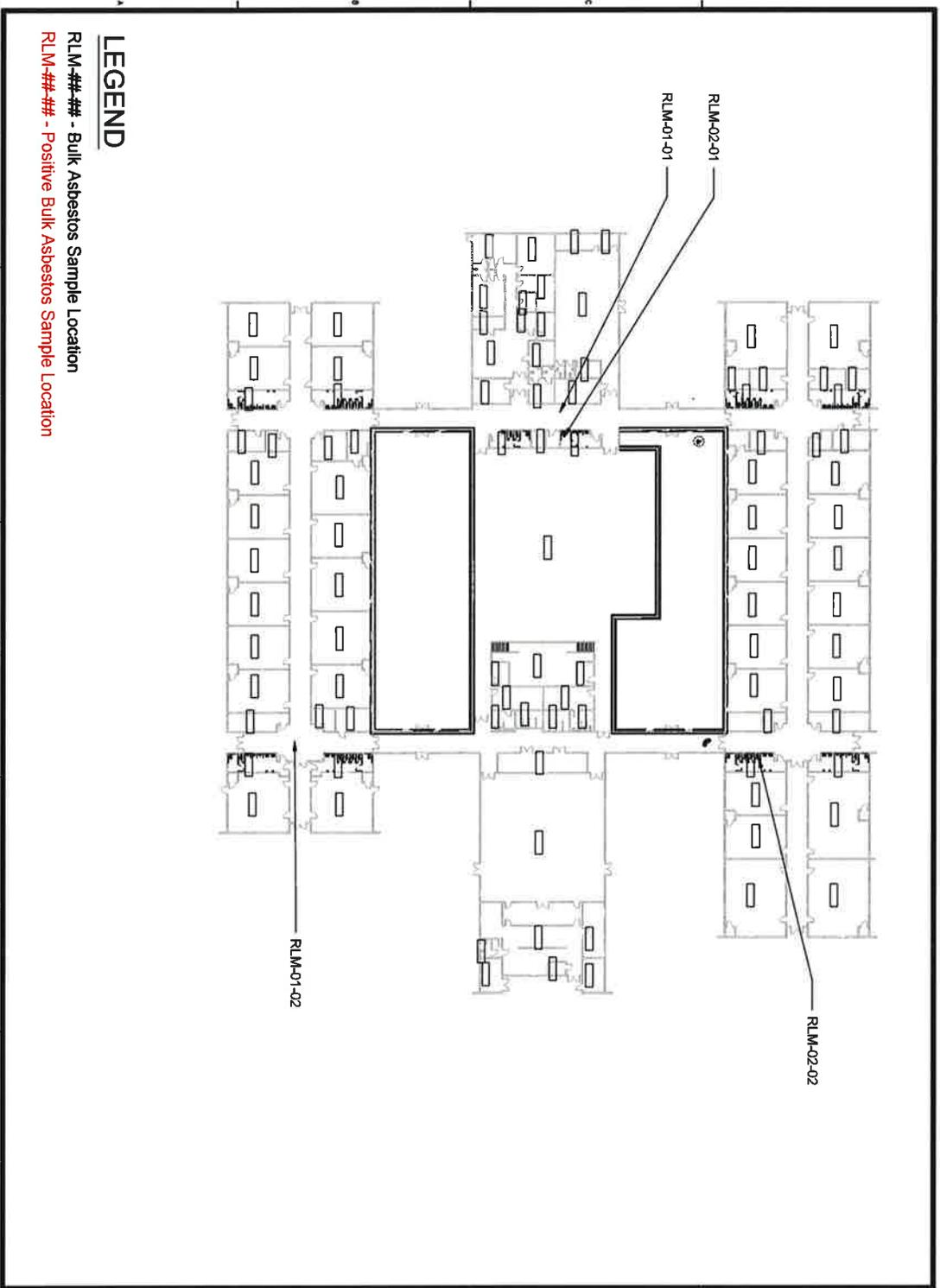
REVISIONS
 DATE
 BY



LEGEND

- DHMS-###-## - Bulk Asbestos Sample Location
- DHMS-##-## - Positive Asbestos Sample Location

<p>3</p>	<p>Drew Hunter Middle School Sunflower County Consolidated School District Drew, Mississippi</p>	 <p>Pickering Firm Inc. 1440 Highway 101, Suite 200, Hattiesburg, MS 39401 Phone: 601.552.1212 Fax: 601.552.1213</p>	<p>PROJECT # 20064-03 DATE October 2021 DRAWN BY: [blank] CHECKED BY: [blank]</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"> </td> <td style="width: 25%;"> </td> <td style="width: 25%;"> </td> <td style="width: 25%;"> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>												

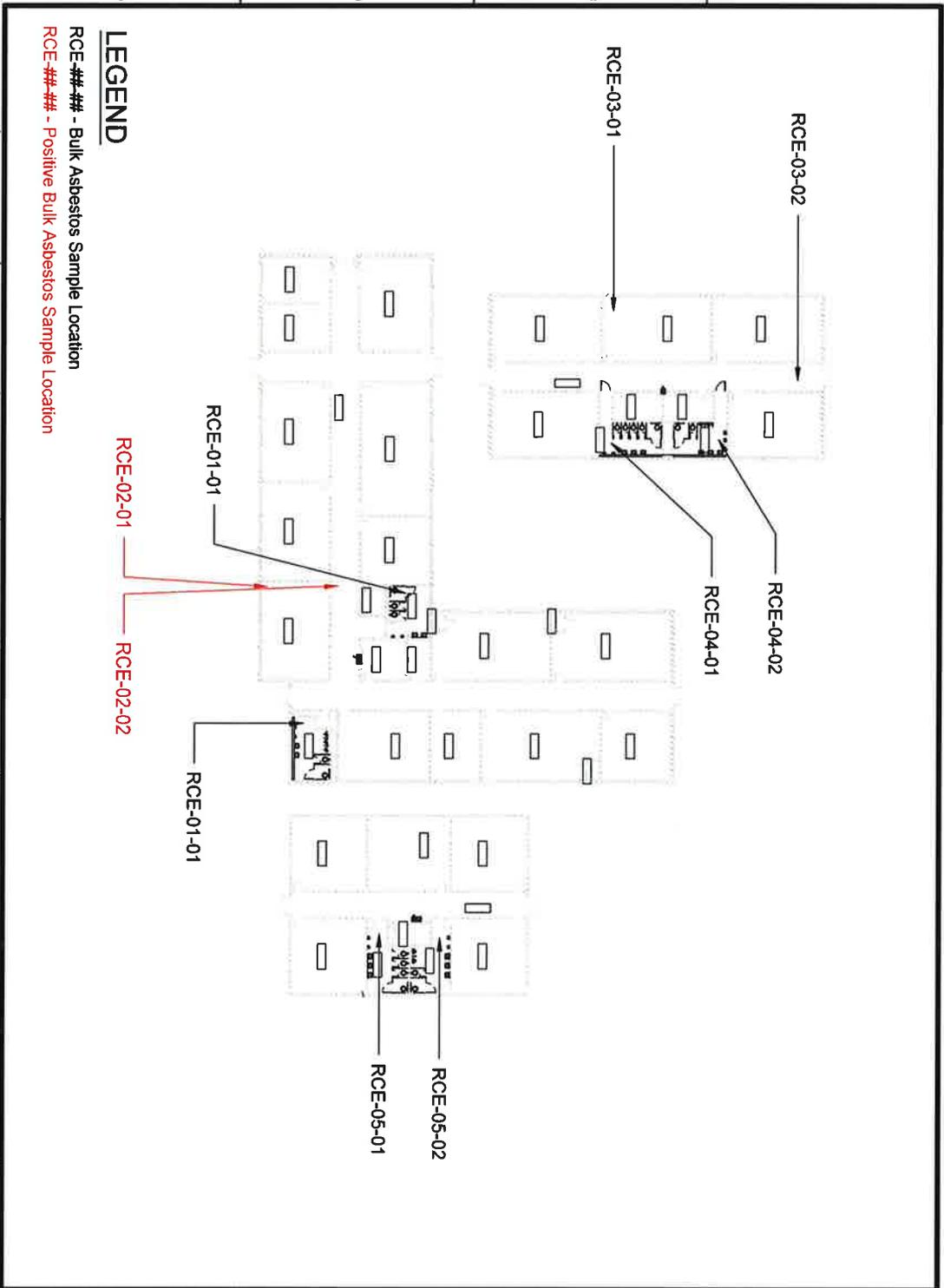


LEGEND

RLM-###-## - Bulk Asbestos Sample Location

RLM-###-## - Positive Bulk Asbestos Sample Location

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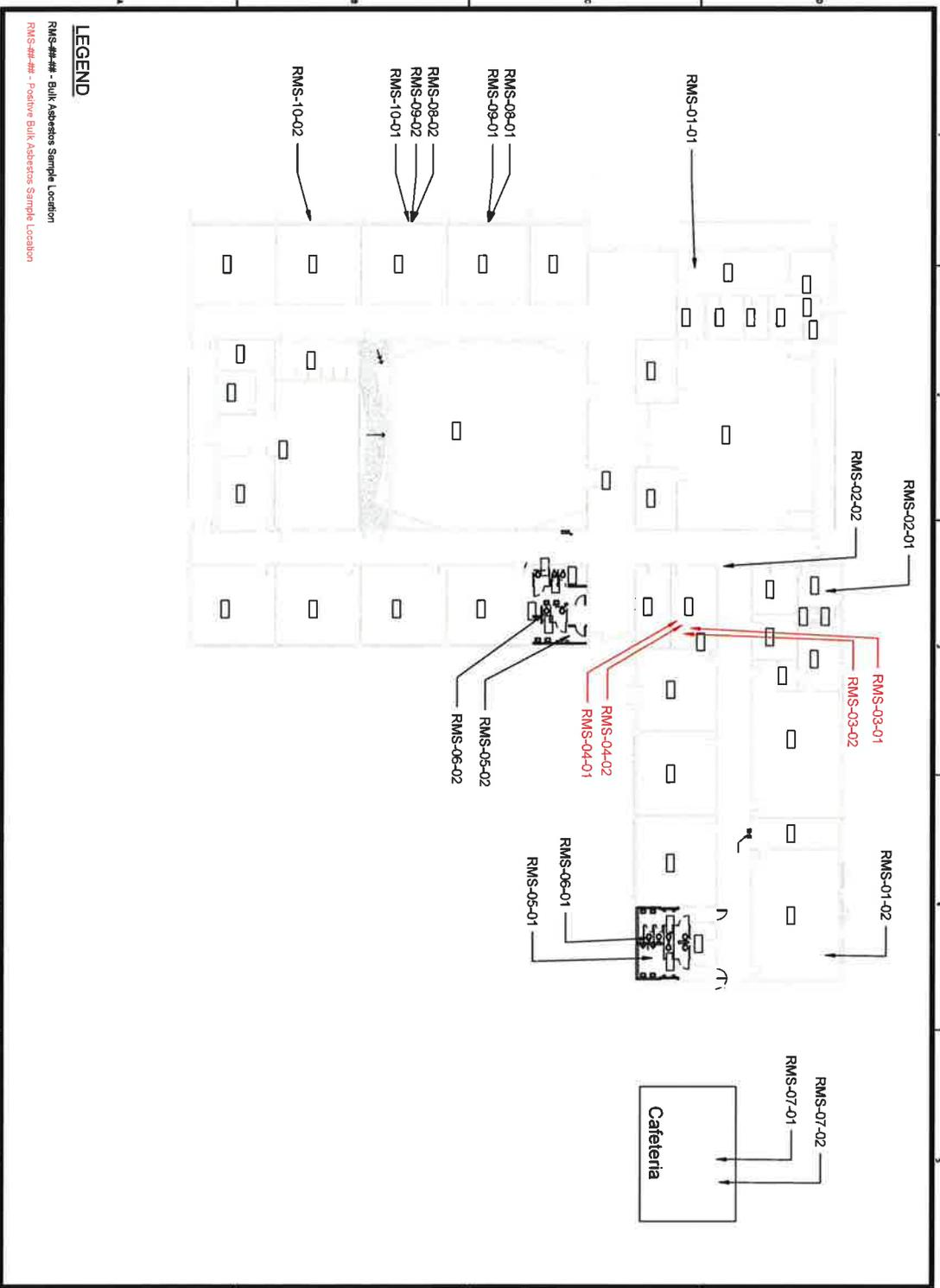


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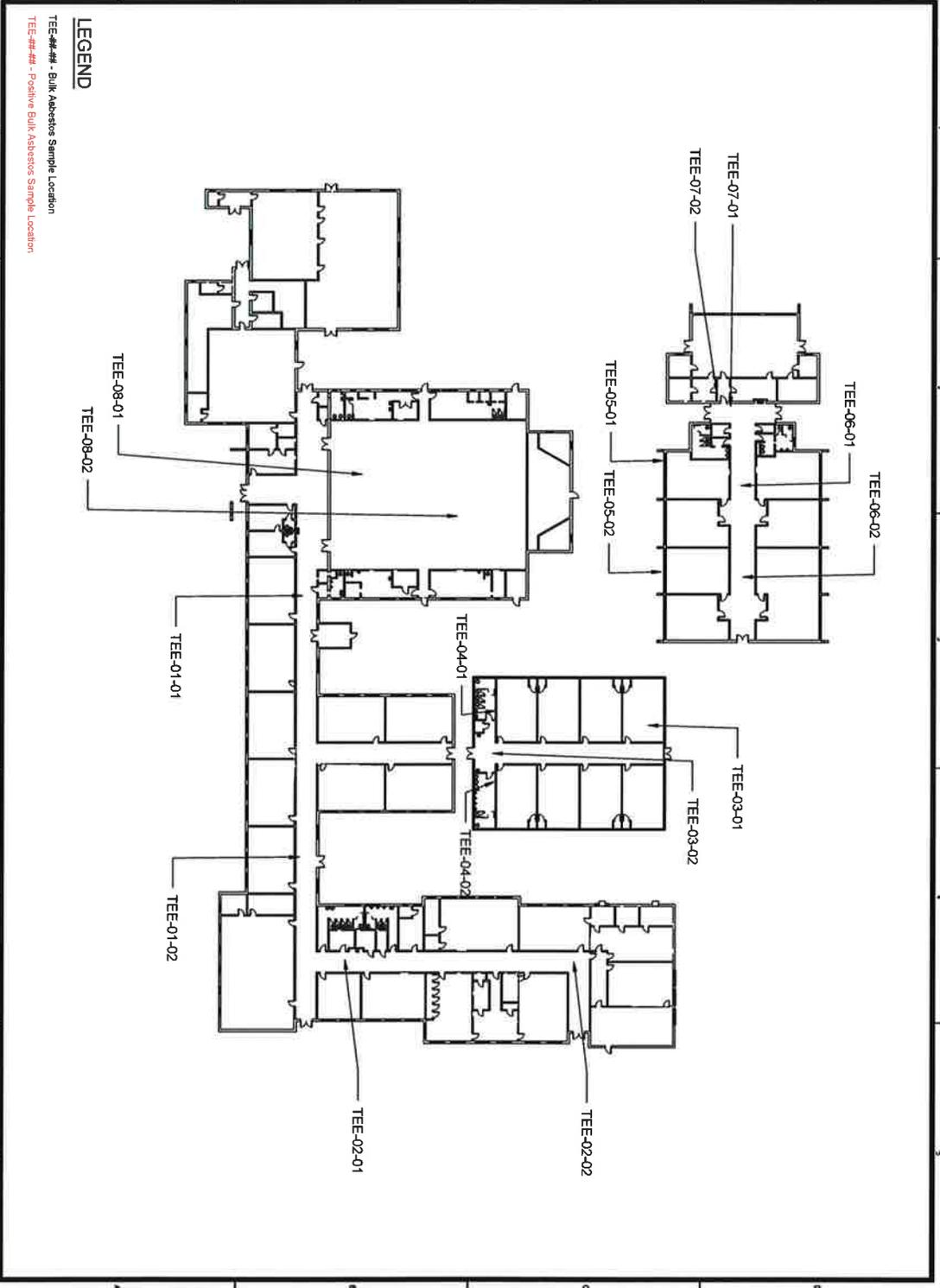
RCE-##-## - Bulk Asbestos Sample Location

RCE-##-## - Positive Bulk Asbestos Sample Location

<table border="1"> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>																																					<p>PROJECT # 21334-27 DATE Nov 2001 DRAWN BY CHECKED BY ORDERED BY</p>	<p>Pickering Pickering Firm, Inc. 2000 West 10th Street, Suite 100 Tulsa, Oklahoma 74107 Phone: 918.438.2000 Fax: 918.438.2001</p>	<p>Ruleville Central Elementary Sunflower County Consolidated School District Indianola, Mississippi</p>	<p>SHEET NUMBER 6</p>	<p>REVISIONS Sample Locations</p>



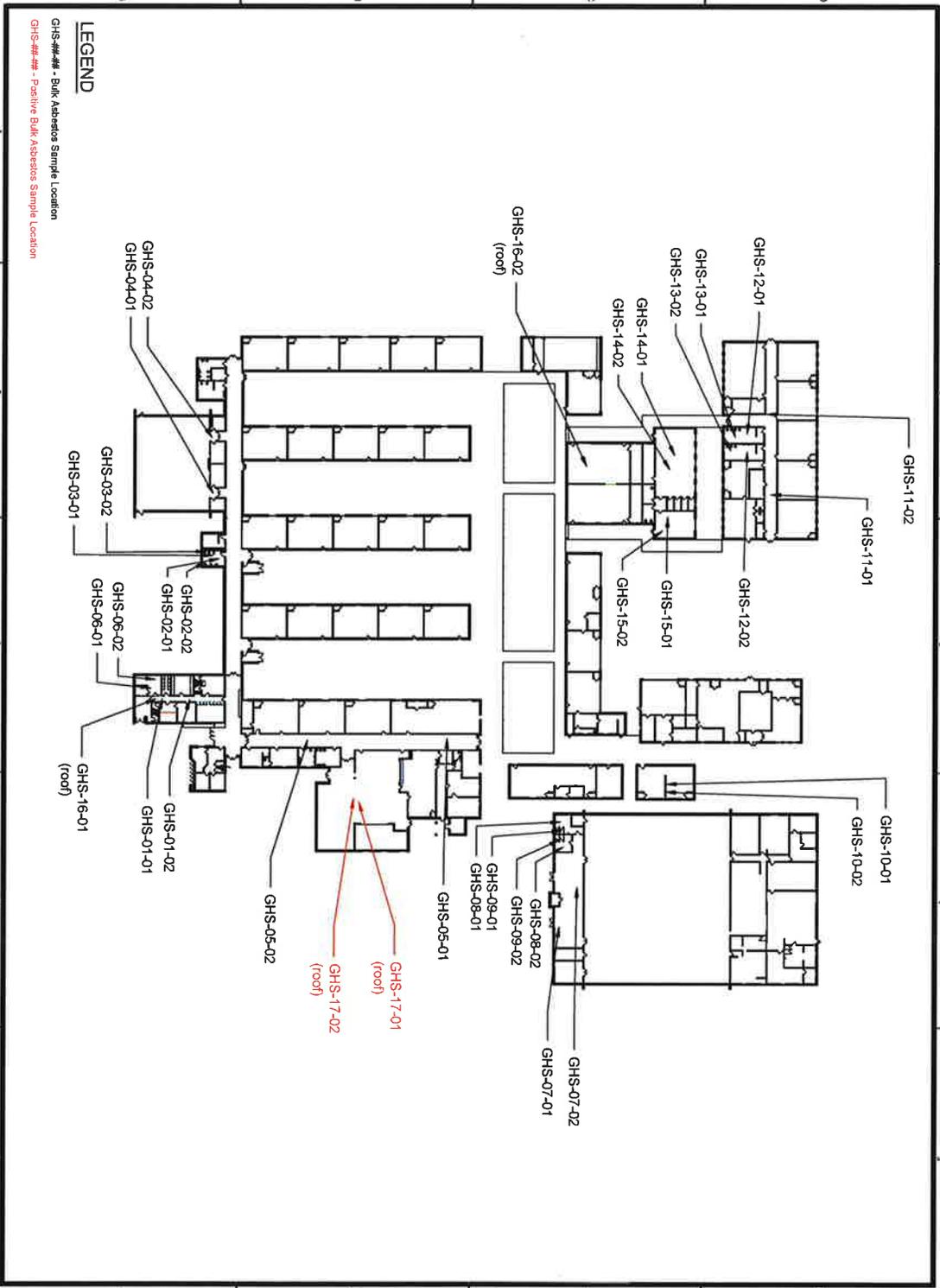
7	Ruleville Middle School Sunflower County Consolidated School District Ruleville, Mississippi	 <small>Pickering Flow, Inc. 1000 Highway 200, Suite 100 Ruleville, MS 38871 Phone: 662-893-1111 Fax: 662-893-1112 Email: info@pickeringflow.com</small>	<table border="1"> <tr> <td>PROJECT #:</td> <td>20087-00</td> </tr> <tr> <td>DATE:</td> <td>November 2011</td> </tr> <tr> <td>SCALE:</td> <td>AS SHOWN</td> </tr> <tr> <td>DATE:</td> <td>11/15/11</td> </tr> <tr> <td>BY:</td> <td>MM</td> </tr> <tr> <td>CHECKED BY:</td> <td>MM</td> </tr> <tr> <td>DATE:</td> <td>11/15/11</td> </tr> </table>	PROJECT #:	20087-00	DATE:	November 2011	SCALE:	AS SHOWN	DATE:	11/15/11	BY:	MM	CHECKED BY:	MM	DATE:	11/15/11
PROJECT #:	20087-00																
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SCALE:	AS SHOWN																
DATE:	11/15/11																
BY:	MM																
CHECKED BY:	MM																
DATE:	11/15/11																



LEGEND

- TEE-##-## - Bulk Asbestos Sample Location
- TEE-##-## - Positive Bulk Asbestos Sample Location

<p>PROJECT #</p> <p>DATE</p> <p>OWNER</p> <p>ORDER #</p>	<p>Pickering</p> <p><small>Pickering Environmental Services, Inc.</small></p> <p><small>10000 Highway 100, Suite 100</small></p> <p><small>Littleton, Colorado 80120</small></p> <p><small>Phone: 303.761.1100</small></p> <p><small>Fax: 303.761.1101</small></p> <p><small>www.pickeringenv.com</small></p>	<p>Thomas E. Edwards High School</p> <p>Sunflower County Consolidated School District</p> <p>Ruleville, Mississippi</p>	<p>SHEET NUMBER</p> <p>8</p>
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LEGEND
 GHS-### - Bulk Asbestos Sample Location
 GHS-###-### - Positive Bulk Asbestos Sample Location

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APPENDIX C
INSPECTOR CERTIFICATION

State of Mississippi

*Department of Environmental Quality
Office of Pollution Control*

Certificate of Licensure

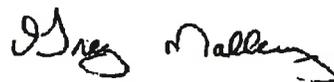
In accordance with the Asbestos Abatement Accreditation and Certification Act,
Enacted as 1989 Mississippi Law, Chapter 505

Be it known that

Willie J. Nester

Having submitted acceptable evidence of qualifications and
training and other appropriate information, is hereby granted this

***Asbestos Inspector
Certification***



*Certificate No.: ABI-00002244
Expiration Date: Feb 4th, 2022
Training Expires on Feb 4th, 2022*

Chief, Asbestos & Lead Branch

40546 LIC20210001

State of Mississippi

*Department of Environmental Quality
Office of Pollution Control*

Certificate of Licensure

In accordance with the Asbestos Abatement Accreditation and Certification Act,
Enacted as 1989 Mississippi Law, Chapter 505

Be it known that

Andrew P. Wilson

Having submitted acceptable evidence of qualifications and
training and other appropriate information, is hereby granted this

***Asbestos Inspector
Certification***



Chief, Asbestos & Lead Branch

*Certificate No.: ABI-00011014
Expiration Date: Aug 11th, 2022
Training Expires on Aug 11th, 2022*

80139 LIC20210001