



STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES

73 mlc

BUSINESS ADMINISTRATION
STATE MILITARY RESERVATION
4 PEMBROKE ROAD
CONCORD, NEW HAMPSHIRE 03301-5652

David J. Mikolaities, Major General
The Adjutant General

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Deputy Adjutant General

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May 20, 2021

His Excellency Governor Christopher T. Sununu
and the Honorable Executive Council
State House
Concord, New Hampshire 03301

REQUESTED ACTION

The Department of Military Affairs and Veterans Services respectfully requests approval to enter into a contract agreement with JBC Construction LLC. (vendor code # 298573), Londonderry, NH 03053 in the amount of \$180,630.00 to provide a complete renovation of latrine areas located in Building C at the State Military Reservation from the date of Governor and Executive Council approval through February 28, 2022. **28% Federal Funds and 72% General Funds**

Funding is available in an account titled Military Affairs and Veterans Services as follows:

010-012-22200000-103-500736- Military Affairs and Veterans Services- CENTRAL ADMIN & ARMORIES-Contract For Operational Services (100% GENERAL FUNDS).

FY 2021
\$80,000.00

010-012-22400000-103-500736- Military Affairs and Veterans Services- ARMY & STATE- Contracts For Operational Services- (50% Federal Funds)

FY 2021
\$100,630.00

GRAND TOTAL **\$180,630.00**

EXPLANATION

A complete renovation of the latrine areas in Building C on the State Military Reservation must meet ADA guidelines for accessibility. Additionally, this project will update the existing under-slab pipe conditions, which currently do not support full building occupancy resulting in repeated maintenance service calls.

The Department of Military Affairs and Veteran Services solicited for this service by placing a Request for Bid (RFB) on the State of New Hampshire Bureau of Purchase and Property website on

His Excellency, Governor Christopher T. Sununu
and the Honorable Executive Council

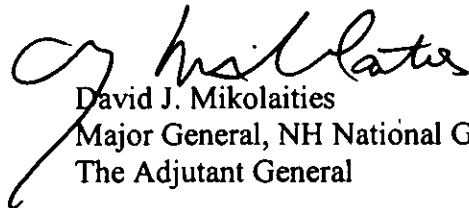
May 20, 2021

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April 21, 2021. The Procurement Technician sent emails to five (5) vendors on March 21, 2021, notifying them of the posting of the bid on the State's Bureau of Purchase and Property Website. Four (4) bids were received before the bid closing time; all were considered qualified. JBC Construction LLC submitted the lowest bid price of the qualified bids and was awarded this contract contingent upon Governor and Council approval.

The contract extension has been approved for form, substance and execution by the Attorney General's Office.

Respectfully submitted,



David J. Mikolaities
Major General, NH National Guard
The Adjutant General

**Construction of Baffled Range Closure Plate
CENTER STRAFFORD TRAINING SITE
STRAFFORD, NEW HAMPSHIRE**

SUMMARY OF QUALIFIED BIDS

The Department of Military Affairs and Veteran Services solicited for this service by placing a Request For Bid (RFB) on the State of New Hampshire Bureau of Purchase and Property website on April 21, 2021. Notification of the RFB was sent to Five (5) companies via email. Four (4) vendors submitted responses to the RFB. JBC Construction LLC submitted a qualified bid and was low cost and was awarded this contract contingent upon Governor and Council approval.

DMAVS received four qualified bids:

Contractor	Bid Amount	Rank
Paxor Construction LLC	\$301,162.51	D
JBC Construction	\$180,630.00	A
Turnstone Corporation	\$249,800.00	C
Charter Brothers Construction, LLC.	\$227,711.00	B

The resulting contract was awarded to JBC Construction LLC. as the company meets the criteria established in the RFB and was qualified bid and provided a lowest cost bid.

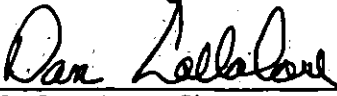
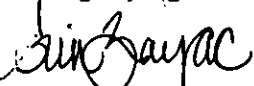

Notice: This agreement and all of its attachments shall become public upon submission to Governor and Executive Council for approval. Any information that is private, confidential or proprietary must be clearly identified to the agency and agreed to in writing prior to signing the contract.

AGREEMENT

The State of New Hampshire and the Contractor hereby mutually agree as follows:

GENERAL PROVISIONS

I. IDENTIFICATION.

1.1 State Agency Name Department of Military Affairs and Veterans Services		1.2 State Agency Address 4 PEMBROKE ROAD CONCORD, NH 03301	
1.3 Contractor Name JBC Construction LLC. (Vendor# 298573)		1.4 Contractor Address PO Box 107 Londonderry, NH 03053	
1.5 Contractor Phone Number (603)965-5262	1.6 Account Number 010-012-22400000-103-500736: \$80,000.00 010-012-22200000-103-500736: \$100,630.00	1.7 Completion Date 02/28/2022	1.8 Price Limitation \$180,630.00
1.9 Contracting Officer for State Agency Erin M. Zayac, Administrator of Business Operations		1.10 State Agency Telephone Number (603)225-1361	
1.11 Contractor Signature  Date: 5/12/2021		1.12 Name and Title of Contractor Signatory	
1.13 State Agency Signature  Date: 5/20/21		1.14 Name and Title of State Agency Signatory Erin M. Zayac, Administrator of Business Operations	
1.15 Approval by the N.H. Department of Administration, Division of Personnel (if applicable) By: _____ Director, On: _____			
1.16 Approval by the Attorney General (Form, Substance and Execution) (if applicable) By:  Attorney On: 6/1/2021			
1.17 Approval by the Governor and Executive Council (if applicable) G&C Item number: _____ G&C Meeting Date: _____			

Contractor Initials 
 Date 5/12/2021

2. SERVICES TO BE PERFORMED. The State of New Hampshire, acting through the agency identified in block 1.1 ("State"), engages contractor identified in block 1.3 ("Contractor") to perform, and the Contractor shall perform, the work or sale of goods, or both, identified and more particularly described in the attached EXHIBIT B which is incorporated herein by reference ("Services").

3. EFFECTIVE DATE/COMPLETION OF SERVICES.

3.1 Notwithstanding any provision of this Agreement to the contrary, and subject to the approval of the Governor and Executive Council of the State of New Hampshire, if applicable, this Agreement, and all obligations of the parties hereunder, shall become effective on the date the Governor and Executive Council approve this Agreement as indicated in block 1.17, unless no such approval is required, in which case the Agreement shall become effective on the date the Agreement is signed by the State Agency as shown in block 1.13 ("Effective Date").

3.2 If the Contractor commences the Services prior to the Effective Date, all Services performed by the Contractor prior to the Effective Date shall be performed at the sole risk of the Contractor, and in the event that this Agreement does not become effective, the State shall have no liability to the Contractor, including without limitation, any obligation to pay the Contractor for any costs incurred or Services performed. Contractor must complete all Services by the Completion Date specified in block 1.7.

4. CONDITIONAL NATURE OF AGREEMENT.

Notwithstanding any provision of this Agreement to the contrary, all obligations of the State hereunder, including, without limitation, the continuance of payments hereunder, are contingent upon the availability and continued appropriation of funds affected by any state or federal legislative or executive action that reduces, eliminates or otherwise modifies the appropriation or availability of funding for this Agreement and the Scope for Services provided in EXHIBIT B, in whole or in part. In no event shall the State be liable for any payments hereunder in excess of such available appropriated funds. In the event of a reduction or termination of appropriated funds, the State shall have the right to withhold payment until such funds become available, if ever, and shall have the right to reduce or terminate the Services under this Agreement immediately upon giving the Contractor notice of such reduction or termination. The State shall not be required to transfer funds from any other account or source to the Account identified in block 1.6 in the event funds in that Account are reduced or unavailable.

5. CONTRACT PRICE/PRICE LIMITATION/PAYMENT.

5.1 The contract price, method of payment, and terms of payment are identified and more particularly described in EXHIBIT C which is incorporated herein by reference.

5.2 The payment by the State of the contract price shall be the only and the complete reimbursement to the Contractor for all expenses, of whatever nature incurred by the Contractor in the performance hereof, and shall be the only and the complete

compensation to the Contractor for the Services. The State shall have no liability to the Contractor other than the contract price.

5.3 The State reserves the right to offset from any amounts otherwise payable to the Contractor under this Agreement those liquidated amounts required or permitted by N.H. RSA 80:7 through RSA 80:7-c or any other provision of law.

5.4 Notwithstanding any provision in this Agreement to the contrary, and notwithstanding unexpected circumstances, in no event shall the total of all payments authorized, or actually made hereunder, exceed the Price Limitation set forth in block 1.8.

6. COMPLIANCE BY CONTRACTOR WITH LAWS AND REGULATIONS/ EQUAL EMPLOYMENT OPPORTUNITY.

6.1 In connection with the performance of the Services, the Contractor shall comply with all applicable statutes, laws, regulations, and orders of federal, state, county or municipal authorities which impose any obligation or duty upon the Contractor, including, but not limited to, civil rights and equal employment opportunity laws. In addition, if this Agreement is funded in any part by monies of the United States, the Contractor shall comply with all federal executive orders, rules, regulations and statutes, and with any rules, regulations and guidelines as the State or the United States issue to implement these regulations. The Contractor shall also comply with all applicable intellectual property laws.

6.2 During the term of this Agreement, the Contractor shall not discriminate against employees or applicants for employment because of race, color, religion, creed, age, sex, handicap, sexual orientation, or national origin and will take affirmative action to prevent such discrimination.

6.3. The Contractor agrees to permit the State or United States access to any of the Contractor's books, records and accounts for the purpose of ascertaining compliance with all rules, regulations and orders, and the covenants, terms and conditions of this Agreement.

7. PERSONNEL.

7.1 The Contractor shall at its own expense provide all personnel necessary to perform the Services. The Contractor warrants that all personnel engaged in the Services shall be qualified to perform the Services, and shall be properly licensed and otherwise authorized to do so under all applicable laws.

7.2 Unless otherwise authorized in writing, during the term of this Agreement, and for a period of six (6) months after the Completion Date in block 1.7, the Contractor shall not hire, and shall not permit any subcontractor or other person, firm or corporation with whom it is engaged in a combined effort to perform the Services to hire, any person who is a State employee or official, who is materially involved in the procurement, administration or performance of this Agreement. This provision shall survive termination of this Agreement.

7.3 The Contracting Officer specified in block 1.9, or his or her successor, shall be the State's representative. In the event of any dispute concerning the interpretation of this Agreement, the Contracting Officer's decision shall be final for the State.

Contractor Initials

Date


5/12/2021

8. EVENT OF DEFAULT/REMEDIES.

8.1 Any one or more of the following acts or omissions of the Contractor shall constitute an event of default hereunder ("Event of Default"):

8.1.1 failure to perform the Services satisfactorily or on schedule;

8.1.2 failure to submit any report required hereunder; and/or

8.1.3 failure to perform any other covenant, term or condition of this Agreement.

8.2 Upon the occurrence of any Event of Default, the State may take any one, or more, or all, of the following actions:

8.2.1 give the Contractor a written notice specifying the Event of Default and requiring it to be remedied within, in the absence of a greater or lesser specification of time, thirty (30) days from the date of the notice; and if the Event of Default is not timely cured, terminate this Agreement, effective two (2) days after giving the Contractor notice of termination;

8.2.2 give the Contractor a written notice specifying the Event of Default and suspending all payments to be made under this Agreement and ordering that the portion of the contract price which would otherwise accrue to the Contractor during the period from the date of such notice until such time as the State determines that the Contractor has cured the Event of Default shall never be paid to the Contractor;

8.2.3 give the Contractor a written notice specifying the Event of Default and set off against any other obligations the State may owe to the Contractor any damages the State suffers by reason of any Event of Default; and/or

8.2.4 give the Contractor a written notice specifying the Event of Default, treat the Agreement as breached, terminate the Agreement and pursue any of its remedies at law or in equity, or both.

8.3. No failure by the State to enforce any provisions hereof after any Event of Default shall be deemed a waiver of its rights with regard to that Event of Default, or any subsequent Event of Default. No express failure to enforce any Event of Default shall be deemed a waiver of the right of the State to enforce each and all of the provisions hereof upon any further or other Event of Default on the part of the Contractor.

9. TERMINATION.

9.1 Notwithstanding paragraph 8, the State may, at its sole discretion, terminate the Agreement for any reason, in whole or in part, by thirty (30) days written notice to the Contractor that the State is exercising its option to terminate the Agreement.

9.2 In the event of an early termination of this Agreement for any reason other than the completion of the Services, the Contractor shall, at the State's discretion, deliver to the Contracting Officer, not later than fifteen (15) days after the date of termination, a report ("Termination Report") describing in detail all Services performed, and the contract price earned, to and including the date of termination. The form, subject matter, content, and number of copies of the Termination Report shall be identical to those of any Final Report described in the attached EXHIBIT B. In addition, at the State's discretion, the Contractor shall, within 15 days of notice of early termination, develop and

submit to the State a Transition Plan for services under the Agreement.

10. DATA/ACCESS/CONFIDENTIALITY/PRESERVATION.

10.1 As used in this Agreement, the word "data" shall mean all information and things developed or obtained during the performance of, or acquired or developed by reason of, this Agreement, including, but not limited to, all studies, reports, files, formulae, surveys, maps, charts, sound recordings, video recordings, pictorial reproductions, drawings, analyses, graphic representations, computer programs, computer printouts, notes, letters, memoranda, papers, and documents, all whether finished or unfinished.

10.2 All data and any property which has been received from the State or purchased with funds provided for that purpose under this Agreement, shall be the property of the State, and shall be returned to the State upon demand or upon termination of this Agreement for any reason.

10.3 Confidentiality of data shall be governed by N.H. RSA chapter 91-A or other existing law. Disclosure of data requires prior written approval of the State.

11. CONTRACTOR'S RELATION TO THE STATE. In the performance of this Agreement the Contractor is in all respects an independent contractor, and is neither an agent nor an employee of the State. Neither the Contractor nor any of its officers, employees, agents or members shall have authority to bind the State or receive any benefits, workers' compensation or other emoluments provided by the State to its employees.

12. ASSIGNMENT/DELEGATION/SUBCONTRACTS.

12.1 The Contractor shall not assign, or otherwise transfer any interest in this Agreement without the prior written notice, which shall be provided to the State at least fifteen (15) days prior to the assignment, and a written consent of the State. For purposes of this paragraph, a Change of Control shall constitute assignment. "Change of Control" means (a) merger, consolidation, or a transaction or series of related transactions in which a third party, together with its affiliates, becomes the direct or indirect owner of fifty percent (50%) or more of the voting shares or similar equity interests, or combined voting power of the Contractor, or (b) the sale of all or substantially all of the assets of the Contractor.

12.2 None of the Services shall be subcontracted by the Contractor without prior written notice and consent of the State. The State is entitled to copies of all subcontracts and assignment agreements and shall not be bound by any provisions contained in a subcontract or an assignment agreement to which it is not a party.

13. INDEMNIFICATION. Unless otherwise exempted by law, the Contractor shall indemnify and hold harmless the State, its officers and employees, from and against any and all claims, liabilities and costs for any personal injury or property damages, patent or copyright infringement, or other claims asserted against the State, its officers or employees, which arise out of (or which may be claimed to arise out of) the acts or omission of the

Contractor, or subcontractors, including but not limited to the negligence, reckless or intentional conduct. The State shall not be liable for any costs incurred by the Contractor arising under this paragraph 13. Notwithstanding the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the State, which immunity is hereby reserved to the State. This covenant in paragraph 13 shall survive the termination of this Agreement.

14. INSURANCE.

14.1 The Contractor shall, at its sole expense, obtain and continuously maintain in force, and shall require any subcontractor or assignee to obtain and maintain in force, the following insurance:

14.1.1 commercial general liability insurance against all claims of bodily injury, death or property damage, in amounts of not less than \$1,000,000 per occurrence and \$2,000,000 aggregate or excess; and

14.1.2 special cause of loss coverage form covering all property subject to subparagraph 10.2 herein, in an amount not less than 80% of the whole replacement value of the property.

14.2 The policies described in subparagraph 14.1 herein shall be on policy forms and endorsements approved for use in the State of New Hampshire by the N.H. Department of Insurance, and issued by insurers licensed in the State of New Hampshire.

14.3 The Contractor shall furnish to the Contracting Officer identified in block 1.9, or his or her successor, a certificate(s) of insurance for all insurance required under this Agreement. Contractor shall also furnish to the Contracting Officer identified in block 1.9, or his or her successor, certificate(s) of insurance for all renewal(s) of insurance required under this Agreement no later than ten (10) days prior to the expiration date of each insurance policy. The certificate(s) of insurance and any renewals thereof shall be attached and are incorporated herein by reference.

15. WORKERS' COMPENSATION.

15.1 By signing this agreement, the Contractor agrees, certifies and warrants that the Contractor is in compliance with or exempt from, the requirements of N.H. RSA chapter 281-A ("*Workers' Compensation*").

15.2 To the extent the Contractor is subject to the requirements of N.H. RSA chapter 281-A, Contractor shall maintain, and require any subcontractor or assignee to secure and maintain, payment of Workers' Compensation in connection with activities which the person proposes to undertake pursuant to this Agreement. The Contractor shall furnish the Contracting Officer identified in block 1.9, or his or her successor, proof of Workers' Compensation in the manner described in N.H. RSA chapter 281-A and any applicable renewal(s) thereof, which shall be attached and are incorporated herein by reference. The State shall not be responsible for payment of any Workers' Compensation premiums or for any other claim or benefit for Contractor, or any subcontractor or employee of Contractor, which might arise under applicable State of New Hampshire Workers' Compensation laws in connection with the performance of the Services under this Agreement.

16. **NOTICE.** Any notice by a party hereto to the other party shall be deemed to have been duly delivered or given at the time of mailing by certified mail, postage prepaid, in a United States Post Office addressed to the parties at the addresses given in blocks 1.2 and 1.4, herein.

17. **AMENDMENT.** This Agreement may be amended, waived or discharged only by an instrument in writing signed by the parties hereto and only after approval of such amendment, waiver or discharge by the Governor and Executive Council of the State of New Hampshire unless no such approval is required under the circumstances pursuant to State law, rule or policy.

18. **CHOICE OF LAW AND FORUM.** This Agreement shall be governed, interpreted and construed in accordance with the laws of the State of New Hampshire, and is binding upon and inures to the benefit of the parties and their respective successors and assigns. The wording used in this Agreement is the wording chosen by the parties to express their mutual intent, and no rule of construction shall be applied against or in favor of any party. Any actions arising out of this Agreement shall be brought and maintained in New Hampshire Superior Court which shall have exclusive jurisdiction thereof.

19. **CONFLICTING TERMS.** In the event of a conflict between the terms of this P-37 form (as modified in EXHIBIT A) and/or attachments and amendment thereof, the terms of the P-37 (as modified in EXHIBIT A) shall control.

20. **THIRD PARTIES.** The parties hereto do not intend to benefit any third parties and this Agreement shall not be construed to confer any such benefit.

21. **HEADINGS.** The headings throughout the Agreement are for reference purposes only, and the words contained therein shall in no way be held to explain, modify, amplify or aid in the interpretation, construction or meaning of the provisions of this Agreement.

22. **SPECIAL PROVISIONS.** Additional or modifying provisions set forth in the attached EXHIBIT A are incorporated herein by reference.

23. **SEVERABILITY.** In the event any of the provisions of this Agreement are held by a court of competent jurisdiction to be contrary to any state or federal law, the remaining provisions of this Agreement will remain in full force and effect.

24. **ENTIRE AGREEMENT.** This Agreement, which may be executed in a number of counterparts, each of which shall be deemed an original, constitutes the entire agreement and understanding between the parties, and supersedes all prior agreements and understandings with respect to the subject matter hereof.

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

EXHIBIT A, SPECIAL PROVISIONS

SUBJECT: SMR Building C Latrine Renovations

The Contract Documents consist of the State of New Hampshire Form P-37; Exhibit A- Special Provisions; Exhibit B- Scope of Services; Exhibit B-Attachment 1- Specifications; Exhibit B Attachment 2- Drawings; Exhibit C- Method of Payment; all Addenda issued prior to execution of the Contract; Bonds where required; insurance certificates; and subsequently thereto, Change Orders issued in accordance with the General Conditions.

The following special provisions modify, change, delete or add to the General Provisions of the agreement. Where any part of the General Provisions is modified or voided by these Special Provisions, the unaltered provisions for that part shall remain in effect.

1. This agreement is funded, wholly or in part, by monies of the Federal Government of the United States; therefore, all parts and provisions of this agreement that refer to contract which are funded in any part by the federal government are applicable to this agreement.

2. The term "Contracting Officer" as used in this agreement shall mean the State's Contracting Officer as is specified at item #1.9 of the General Provisions of this agreement or his/her authorized representative. No individual shall be an authorized representative of the Contracting Officer unless he or she is so appointed in writing by the Contracting Officer, in which case such written appointment shall be provided to the Contractor.

3. The Contractor acknowledges and agrees that this Agreement was entered into following the coronavirus disease 2019 (COVID-19) outbreak. The Contractor agrees that to the extent the COVID-19 outbreak, or any federal, state or local orders, regulations, rules, restrictions, or emergency declarations relating to COVID-19, disrupt, delay, or otherwise impact the Scope of Services to be performed by the Contractor as set forth in EXHIBIT B of this Agreement, any such disruption, delay, or other impact was foreseeable at the time this Agreement was entered into by the Parties and does not excuse the Contractor's performance under this Agreement. The Contractor agrees that any such impact, including any disruption to supply chains, workforce reductions, delays or interruptions in performance, or other effects on businesses, are not the fault of the State and the Contractor may not seek damages against the State for any such impacts.

If the Contractor experiences or anticipates any such COVID-19-related impacts to this Agreement, the Contractor shall immediately notify the Contracting Officer. In the event of any COVID-19-related impact or anticipated impact to this Agreement, the Contracting Officer shall have the right to temporarily modify, substitute, or decrease the Services, without the approval of

the Governor and Executive Council, upon giving written notice to the Contractor. The State's right to modify includes, but is not limited to the right to modify service priorities, including how and when Services are delivered, and expenditure requirements under this Agreement so as to achieve compliance therewith, provided such modifications are within the Scope of Services and cost limitations of this Agreement. By exercising any of the rights described within this subsection, the State does not waive any of its right under this Agreement.

In the event that a modification by the State under this subsection would result in a reduction of Services that cannot be supplemented during the remaining term of this Agreement with either replacement or substituted services of substantially similar value, the Parties shall submit an amendment to this Agreement with a commensurate reduction in the price. In order to facilitate reconciliation of services performed under this Agreement, the Contractor shall submit weekly reports detailing the following for any service not fully performed pursuant to the terms of the Agreement:

- 1) The services required to be performed under the terms of this Agreement as written;
- 2) The services actually performed;
- 3) Any replacement or substituted services performed with reference to the associated unperformed contracted services.

4. The Contractor shall be responsible to correct, at his own cost and expense, defective work, or damaged property when defects and damage are caused by the Contractor's employees, equipment or supplies. The Contracting Officer may withhold all, or part of, payments due to the Contractor until defective work or damaged property caused by the Contractor, his employees, equipment or materials, is placed in satisfactory condition

5. General Provisions are amended as follows:

a. Provision 7. PERSONNEL sub-part 7.2: after "who is a State employee or official," add the following:

"or who is a National Guardsperson or who is a federal employee of the National Guard,"

b. Provision 10. DATA: ACCESS; CONFIDENTIALITY; PRESERVATION: Add the following sub-part:

10.4 Between the Effective Date and three (3) years after the Completion Date, as often as the State or Federal Government shall demand, the Contractor shall make available for audit purposes, all records that pertain to this Agreement. Upon demand the contractor shall provide copies of such documents which may include invoices, payrolls, records of personnel, and other information relating to all matters covered in this agreement.

c. **Provision 14. INSURANCE AND BOND sub-part 14.1.1:** after excess; remove the word and, and add the following:

“\$2,000,000 Products/Completed Operations Aggregate”

d. **Provision 14. INSURANCE AND BOND ADD** the following sub-part:

14.1.3 Insurance against all claims arising from the Contractor's use of automobiles in the conduct of this agreement, in amounts of not less than \$250,000.00 per person bodily injury liability, \$500,000.00 per occurrence bodily injury liability and \$50,000.00 property damage liability.

e. **Provision 19. CONFLICTING TERMS: Add** the following sub-part:

19.1 Should the Contract Documents disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and or materials, unless specifically otherwise directed by written Addendum to the Contract

6. ADD the following as Special Provisions to the extent not inconsistent with the express terms of this Agreement, the provisions of 32 CFR Part 33, Uniform Administrative Requirements for Grants and Cooperative Agreements, DoD Grant and Agreement Regulations (DoDGARS) (DoD 3210.6-R) as amended, Title 2 Code of Federal Regulations (CFR) Part 225, and NGR 5-1, are hereby incorporated into this MCA by reference as if fully set forth herein, shall govern this Agreement:

Nondiscrimination.

The Grantee covenants and agrees that no person shall be subject to discrimination or denied benefits in connection with the State's performance under the MCA. Accordingly, and to the extent applicable, the Grantee covenants and agrees to comply with the following national policies prohibiting discrimination:

a. On the basis of race, color or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. Section 2000d et seq.), as implemented by DoD regulations at 32 CFR part 195.

b. On the basis of race, color or national origin, in Executive Order 11246 as implemented by Department of Labor regulations at 41 CFR part 60.

c. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. 1681, et seq.), as implemented by DoD regulations at 32 CFR part 196.

d. On the basis of age, in The Age Discrimination Act of 1975 (42 U.S.C. Section 6101 et seq.), as implemented by Department of Health and Human Services regulations at 45 CFR part 90.

e. On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR part 56.

Lobbying.

a. The state covenants and agrees that it will not expend any funds appropriated by Congress to pay any person for influencing or attempting to influence an officer or employee of any agency, or a Member of Congress in connection with any of the following covered federal actions. The awarding of any federal contract; the making of any federal grant; the making of any federal loan; the entering into of any CA; and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or Cooperative Agreement.

b. The Final Rule, New Restrictions on Lobbying, issued by the Office of Management and Budget and the Department of Defense (32 CFR Part 28) to implement the provisions of Section 319 of Public Law 101-121 (31 U.S.C. Section 1352) is incorporated by reference and the state agrees to comply with all the provisions thereof, including any amendments to the Interim Final Rule that may hereafter be issued.

Drug-Free work Place.

The Grantee covenants and agrees to comply with the requirements regarding drug-free workplace requirements in of 32 CFR Part 26, which implements section 5151-5160 of the Drug-Free Workplace act of 1988 (Public Law 100-690, Title V, Subtitle D; 41 U.S.C. 701, et seq.).

Environmental Protection.

a. The Grantee covenants and agrees that its performance under this Agreement shall comply with:

- (1) The requirements of Section 114 of the Clean Air Act (42 U.S.C. Section 7414);
- (2) Section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), that relates generally to inspection, monitoring, entry reports, and information, and with all regulations and guidelines issued there under;
- (3) The Resources Conservation and Recovery Act (RCRA);
- (4) The Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA);
- (5) The National Environmental Policy Act (NEPA);
- (6) The Solid Waste Disposal Act.

(7) The applicable provisions of the Clean Air Act (42 U.S.C. 7401, et seq.) and Clean Water Act (33 U.S.C. 1251, et seq.), as implemented by Executive Order 11738 and Environmental Protection Agency (EPA) rules at Subpart J of 40 CFR part 32;

(8) To identify any impact this award may have on the quality of the human environment and provide help as needed to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4321, et seq.) and any applicable federal, state or local environmental regulation.

(9) The applicable provision of the Clean Air Act (42 U.S.C. § 7401, et seq.) and Clean Water Act (33 USC 1251, et seq.), as implemented by Executive Order 11738 [3 CFR, 1971-1975 comp., p.799].

b. In accordance with the EPA rules, the parties further agree that the Grantee shall also identify to the awarding agency (NGB) any impact this award may have on:

(1) The quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C 4321, et seq.) and to prepare Environment Impact Statements or other required environmental documentation. In such cases, the recipient agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

(2) Flood-prone areas, and provide help the agency may need to comply with the National Flood Insurance Act of 1968 and Flood Disaster Protection Act of 1973 (42 U.S.C. 4001, et seq.), which require flood insurance, when available, for federally assisted construction or acquisition in flood-prone areas.

(3) Coastal zones, and provide help the agency may need to comply with the Coastal Zone Management Act of 1972 (16 U.S.C. 1451, et seq.), concerning protection of U.S. coastal resources.

(4) Coastal barriers, and provide help the agency may need to comply with the Coastal Barriers Resource Act (16 U.S.C. 3501 et seq.), concerning preservation of barrier resources.

(5) Any existing or proposed component of the National Wild and Scenic Rivers System, and provide help the agency may need to comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271 et seq.).

(6) Underground sources of drinking water in areas that have an aquifer that is the sole or principal drinking water source, and provide help the agency may need to comply with the Safe Drinking Water Act (42 U.S.C 300H-3).

Use of United States Flag Carriers.

a. The state covenants and agrees that travel supported by U.S. Government funds under this agreement shall use U.S.-flag air carriers (air carriers holding certificates under 49 U.S.C. 41102) for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 U.S.C. 40118) and the inter-operative guidelines issued by the Comptroller General of the United States in the March 31, 1981, amendment to Comptroller General Decision B138942.

b The state agrees that it will comply with the Cargo Preference Act of 1954 (46 U.S.C. 1241), as implemented by Department of Transportation regulation at 46 CFR 381.7, and 46 CFR 381.7(b).

Debarment and Suspension.

Non-federal entities and contractors are subject to the non-procurement debarment and suspension regulations implementing Executive Orders 12549 and 12698, 2 CFR part 180. These regulations restrict awards, sub awards, and contracts with certain parties that are debarred, suspended, or otherwise excluded for or ineligible for participation in Federal assistance programs or activities. The State complies with the DOD implementation of 2 CFR part 180 (at 2 CFR Part 1125) by checking the Excluded Parties List System (EPLS) at www.sam.gov to verify contractor eligibility to receive contracts and subcontracts resulting from the Federal Agreement which funds this contract. The state shall not solicit offers from, nor award contracts to contractors listed in EPLS. This verification shall be documented in the State and sub recipient contract files, and shall be subject to audit by the grantor and Federal/State audit agencies.

Buy American Act.

The state covenants and agrees that it will not expend any funds appropriated by Congress without complying with The Buy American Act (41 U.S.C. 10). The Buy American Act gives preference to domestic end products and domestic construction material. In addition, the Memorandum of Understanding between the United States of America and the European Economic Community (EEC) on Government Procurement, and the North American Free Trade Agreement (NAFTA), provide that EEC and NAFTA end products and construction materials are exempted from application of the Buy American Act.

Uniform Relocation Assistance and real Property Acquisition Policies.

The state covenants and agrees that it will comply with CFR 49 part 24, which implements the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. Section 4601 et seq.) and provides for fair and equitable treatment of persons displaced by federally assisted programs or persons whose property is acquired as a result of such programs.

Copeland "Anti-Kickback" Act.

The state covenants and agrees that it will comply with the Copeland "Anti-Kickback" Act (18 U.S.C. Section 874) as supplemented in Department of Labor regulations (29 CFR Part 3). As applied to this agreement, the Copeland "Anti-Kickback" Act makes it unlawful to induce, by force, intimidation, threat of procuring dismissal from employment, or otherwise, any person employed in the construction or repair of public buildings or public works, financed in whole or

in part by the United States, to give up any part of the compensation to which that person is entitled under a contract of employment.

Contract Work Hours and Safety Standards Act.

The state covenants and agrees that it will comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. Sections 327-330) as supplemented by Department of Labor regulations (29 CFR Part 5). As applied to this agreement, the Contract Work Hours and Safety Standards Act specifies that no laborer or mechanic doing any part of the work contemplated by this agreement shall be required or permitted to work more than 40 hours in any workweek unless paid for all additional hours at not less than 1.5 times the basic rate of pay.

National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2019 (Public Law 115-232)

The grantee covenants and agrees that it will not use "covered telecommunications equipment or services," as that term is defined in Section 889 of the NDAA for FY 2019, as a substantial or essential component of any system or as critical technology as part of any system involved in the grantee's performance of this contract. The grantee further covenants and agrees that it will neither contract, nor permit to be contracted or subcontracted any part of its performance under this contract to any entity that uses such covered telecommunications equipment or services as a substantial or essential component of any system or as critical technology as part of any system.

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

EXHIBIT B – SCOPE OF SERVICES

Subject: SMR Building C Latrine Renovations

The Exhibit A – (“Services”) as stated in the contract (Form P-37) and related to the above referenced project, shall include all the information and requirements about the project that are derived from the project specifications, the authorized construction drawings/documents and clarification sketches as well as any addendums.

PROJECT OVERVIEW:

Complete renovation of latrine areas in building C. This project will fix the lack of ADA accessibility due to the age of the existing design and the problem of repeated service calls due to existing under-slab pipe conditions.

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

EXHIBIT B, ATTACHMENT 1

SUBJECT: BLDG C Latrines

Section 00 41 00	GENERAL CONDITIONS
Section 00 21 13	INSTRUCTIONS TO BIDDERS
Section 01 20 00	PRICE AND PAYMENT PROCEDURES
Section 01 33 00	SUBMITTAL PROCEDURES
Section 01 50 00	TEMPORARY FACILITIES AND CONTROLS
Section 01 70 00	EXECUTION REQUIREMENTS
DIVISION 01	BY OWNER
DIVISION 02	EXISTING CONDITIONS
DIVISION 02-024119	SELECTIVE DEMOLITION
DIVISION 03	CONCRETE
DIVISION 03-033053	MISCELLANEOUS CAST-IN-PLACE CONCRETE
DIVISION 06	WOOD, PLASTICS, AND COMPOSITES
DIVISION 06-061000	ROUGH CARPENTRY
DIVISION 06-064116	PLASTIC LAMINATE CLAD ARCHITECTURAL CABINETS
DIVISION 07	THERMAL AND MOISTURE PROTECTION
DIVISION 07 - 072119	FOAMED-IN-PLACE INSULATION
DIVISION 07 -079200	JOINT SEALANTS
DIVISION 08 -	OPENINGS
DIVISION 08 -081213	HOLLOW METAL DOORS AND FRAMES
DIVISION 08 - 081416	FLUSH WOOD DOORS
DIVISION 08 - 087100	DOOR HARDWARE
DIVISION 09 -	FINISHES
DIVISION 09 - 092216	NON-STRUCTURAL METAL FRAMING
DIVISION 09 - 092900	GYPSTUM BOARD
DIVISION 09 - 093000	PORCELAIN FLOOR TILE - DEDUCT ALTERNATE NO. 1
DIVISION 09 - 093013	CERAMIC TILING
DIVISION 09 - 095123	ACOUSTICAL TILE CEILINGS
DIVISION 09 - 096513	RESILIENT BASE AND ACCESSORIES
DIVISION 09 - 099123	INTERIOR PAINTING
DIVISION 10	SPECIALTIES
DIVISION 10- 101423	PANEL SIGNAGE
DIVISION 10- 102113	PLASTIC TOILET COMPARTMENTS
DIVISION 10- 102800	TOILET AND BATH ACCESSORIES
DIVISION 12	FURNISHINGS
DIVISION 12- 123661	SOLID SURFACING COUNTERTOPS & INTERIOR WINDOW SILLS

DIVISION 22	PLUMBING
DIVISION 22- 220500	COMMON WORK RESULTS FOR PLUMBING
DIVISION 22- 220517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
DIVISION 22-220518	ESCUTCHEONS FOR PLUMBING PIPING
DIVISION 22- 220523.12	BALL VALVES FOR PLUMBING PIPING
DIVISION 22- 220529	HANGERS AND SUPPORTS FOR PLUMBING PIPING EQUIPMENT
DIVISION 22- 220553	IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
DIVISION 22-220719	PLUMBING PIPING INSULATION
DIVISION 22-221116	DOMESTIC WATER PIPING
DIVISION 22-221119	DOMESTIC WATER PIPING SPECIALTIES
DIVISION 22-221316	SANITARY WASTE AND VENT PIPING
DIVISION 22-221319	SANITARY WASTE PIPING SPECIALTIES
DIVISION 22-224213.13	COMMERCIAL WATER CLOSETS
DIVISION 22-224213.16	COMMERCIAL URINALS
DIVISION 22-224216.13	COMMERCIAL LAVATORIES
DIVISION 23	HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
DIVISION 23-230500	COMMON WORK RESULTS FOR HVAC
DIVISION 23- 230517	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING
DIVISION 23- 230518	ESCUTCHEONS FOR HVAC PIPING
DIVISION 23- 230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
DIVISION 23- 230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
DIVISION 23- 230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC
DIVISION 23- 230713	DUCT INSULATION
DIVISION 23- 230719	HVAC PIPING INSULATION
DIVISION 23- 232113	HYDRONIC PIPING
DIVISION 23- 233113	METAL DUCTS
DIVISION 23- 233300	AIR DUCT ACCESSORIES
DIVISION 23- 233713.13	AIR DIFFUSERS
DIVISION 26-260000	ELECTRICAL

GENERAL CONDITIONS

1. CONTRACT DOCUMENTS

- A. The Contract Documents consist of the Contract Agreement, General Conditions, and Supplementary General Conditions, Drawings and Specifications, including all Addenda issued prior to execution of the Contract; Bonds where required; insurance certificates; and subsequently thereto, Change Orders issued in accordance with the General Conditions.
- B. The Contract Documents shall be signed by the Department and the Contractor in as many original counterparts as may be mutually agreed. No Contract shall be considered as in effect until it has been fully executed by all of the parties thereto and the award concurred in by Governor and Council. If there is federal funding, it must also have the concurrence of the applicable Federal Agency having jurisdiction.
- C. This Contract is executed in a number of counterparts, each of which is an original and constitutes the entire agreement between the parties. This Contract shall be construed according to the laws of the State of New Hampshire. No portion of this Contract shall be understood to waive the sovereign immunity of the State. This Contract shall not be amended, except as specified herein, except with the approval of the Governor and Council.
- D. The Contract Documents are complementary and anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required by all.
- E. Should the Contract Documents disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and or materials, unless specifically otherwise directed by written Addendum to the Contract.
- F. The Contractors and all subcontractors shall refer to all of the Contract Documents, including those not specifically showing the work of their specialized trades, and shall perform all work reasonably inferable from them as being necessary to produce the intended results.
- G. All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the work, except where a contrary result is clearly indicated by the Contract Documents.
- H. Where codes, standards, requirements, and publications of public and private bodies are referred to in the Contract Documents, such references shall be understood to be to the latest revision prior to the date of receiving Bids, except where otherwise indicated.
- I. Where no explicit quality or standards for materials or workmanship is established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding work and of the construction of the Project in general.
- J. All manufactured articles, materials, and equipment shall be applied, installed,

connected, erected, tested, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions, unless specifically indicated otherwise in the Contract Documents.

- K. The Drawings are generally made to scale, but all working dimensions shall be taken from the figured dimensions or by actual measurements at the job. In case by scaling. Study and compare all the Drawings and verify all figures before laying out or constructing work. The Contractor shall be responsible for errors in his work that might have been avoided thereby. Whether or not an error is believed to exist, deviation from the Drawings and the dimensions given thereon shall be made only after approval in writing from the Department.
- L. The Mechanical, Fire Protection (sprinkler) and Electrical Drawings, when provided, are diagrammatic only, and are not intended to show the exact physical locations or configurations of work. Such work shall be installed to clear all obstructions, permit proper clearances by coordinating his work with other trades, and present an orderly appearance where exposed.

2. ACCESS TO THE WORK

- A. The Contractor shall provide for access to the work for inspection by the Department and government officials having jurisdiction. The Consultant, Engineer, and officials of Local, State, and Federal Agencies in the case of such programs as they administer and their authorized representatives shall have access at all times to the work for inspection wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection.

3. CONTRACT ADMINISTRATION

- A. The Department shall determine the amount, quality, and acceptability and fitness of all parts of the work, shall interpret the Contract Documents, and any Change Orders, and shall decide all other issues in connection with the work. The Department shall have the authority to approve or order changes in the work that alter the terms or conditions of the Contract. The Department shall confirm in writing any oral order, direction, requirements or determination.
- B. When a Federal Agency participates in the cost of the work covered by this Contract, the work shall be under the observation and inspection of the Department, but subject to the inspection and approval of the proper officials of the Federal Agency.

4. ACCIDENT PROTECTION

- A. It is a condition of this Contract, and shall be made a condition of each subcontract entered into pursuant to the Contract, that the Contractor and any Subcontractors shall not require any laborer or mechanic employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his health of safety as determined by construction safety and health standards of the Occupational Safety and Health Administration, United States Department of Labor, which standards include, by reference, the established Federal Safety and Health Regulations for Construction. These standards and regulations comprise Part 1910 and Part 1926 respectively of Title 29 of the Code of Federal Regulations and are set forth in the Federal Register. In the event any revisions in the

Code of Federal Regulations are published, such revisions will be deemed to supersede the appropriate Part 1910 and Part 1926, and be effective as of the date set forth in the revised regulation.

5. HAZARDOUS MATERIALS

- A. The Contractor shall also be aware of laws and regulations relating to hazardous materials that may be encountered during construction operations, either within project limits or at material sites off the project. The health and safety of employees, the general public, and the potential of damage to the overall environment is possible if hazardous materials are not recognized, reported, and the appropriate action taken to dispose of, remove from the site, or otherwise contain the possible contaminants.
- B. If any abnormal condition is encountered or exposed that indicates the presence of a hazardous material or toxic waste, construction operations shall be immediately suspended in the area and the Department notified. No further work shall be conducted in the area of the contaminated material until the site has been investigated and the Department has given approval to continue the work in the area. The Contractor shall fully cooperate with the Department and perform any remedial work as directed. Work shall continue in other areas of the Project unless otherwise directed.
- C. Exposure to hazardous materials may result from contact with, but not necessarily limited to, such items as drums, barrels, and other containers, waste such as cars, batteries, and building construction debris. Containers leaking unknown chemicals or liquids, abandoned cars leaking petroleum products, batteries leaking acid, construction debris which may include asbestos, or any other source of suspected hazardous material found within excavation areas or stockpiled on land within construction limits shall be referred to the Department of Environmental Services and the Department so that a proper identification of the materials may be made and disposal procedures initiated as required.
- D. Disposition of the hazardous material or toxic waste shall be made under the requirements and regulations of the Department of Environmental Services. Work required disposing of these materials and any remedial work shall be performed under a Supplemental Agreement or Contract item, if included in the Contract.

6. SUBCONTRACTS

- A. Nothing contained in the Specifications or Drawings shall be construed as creating any contractual relationship between any Subcontractor and the Department. The Divisions or Sections of the Specifications are not intended to control the Contractor in dividing the work among Subcontractors or to limit the work performed by any trade.
- B. The Contractor shall be as fully responsible to the Department for the acts and omissions of Subcontractors and of persons employed by them, as he is for the acts and omissions of persons directly employed by him.
- C. The Contractor shall, without additional expense to the State, utilize the services of specialty Subcontractors, as required.
- D. The Department will not normally undertake to settle any differences between the Contractor and his Subcontractors or between Subcontractors.

- E. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Department may exercise over the Contractor under any provisions of the Contract Documents.
- F. Within fifteen (15) days after the award of the Contract, the Contractor shall submit a complete list of all of the Subcontractors setting forth in detail the work they will be responsible for. If a subcontractor is added during the construction process the Contractor will revise the list and resubmit to the Department.
7. **RESPONSIBILITY OF CONTRACTOR TO ACT IN EMERGENCY**
- A. In case of any emergency that threatens loss or injury of property, and/or safety of life, the Contractor shall act, without previous instructions from the Department, as the situation may warrant. He shall notify the Department thereof immediately thereafter. Any compensation claimed by the Contractor together with substantiating documents in regard to expense, shall be submitted to the Department and the amount of compensation shall be determined by agreement.
8. **SEPARATE CONTRACTS**
- A. The Department may award other Contracts in connection with the Project, the work under which will proceed simultaneously with the execution of this Contract. The Contractor shall coordinate operations with those of other Contractors.
9. **MUTUAL RESPONSIBILITY OF CONTRACTORS**
- A. If the Contractor or any of his/her Subcontractors or employee's causes loss or damage to any separate Contractor or Subcontractor on the work, the Contractor or Subcontractor agrees to settle with such separate Contractor or Subcontractor by agreement, if he/she will so settle. If such separate Contractor or Subcontractor sues the State because of any loss so sustained, the Department shall notify the Contractor and/or their subcontractors, who shall indemnify and hold harmless the Department against any expenses or judgment arising there from.
10. **PAYMENTS TO CONTRACTOR**
- A. The Department will manifest payments to the Contractor each calendar month on the basis of duly certified and approved estimate of the work performed during the preceding period. In preparing estimates, the material delivered on the site and any preparatory work done may be taken into consideration.
- B. At least ten (10) days before the end of the billing period, the Contractor shall submit to the Department an itemized Requisition for Payment, supported by such data substantiating the Contractor's right to payment as the Department may require. If payment is to be made on account of materials or equipment not incorporated in the work, but delivered and suitably stored at the site, such payment shall be conditional upon submission by the Contractor of bills of sale or such other procedure satisfactory to the Department to establish the State's title to such materials or equipment or otherwise protect the State's interest including applicable insurance.

- C. Immediately upon receipt of the Department Approved Monthly Requisition for Payment, Contractor shall post same at the Contractor's Field Office or project site in a location where Subcontractors and Suppliers have clear access.
- D. A five (5) percent retainage of the value of the work performed on each partial estimate will be deducted and retained by the Department until after completion of the entire Contract in an acceptable manner. The balance remaining after the specified percentage has been retained, less all previous payments, will be certified for payment on each partial estimate.
- E. Within thirty (30) days after acceptance, the Department shall pay to the Contractor the amount of the Contract less all prior payments. All prior payments and estimates, including those relative to extra work, shall be subject to correction by this payment, which is throughout this Contract called the Final Payment.
- F. Retainage will be released at Final Payment.
- i. After the Certificate of Substantial Completion has been issued, upon written application by the Contractor and with the approval of the Surety, the Department may release a portion of the retained amount.
- G. Payment for Material On Hand:
- i. Partial payments are made for materials to be incorporated in the Work, provided the materials meet the requirements of the Contract and are delivered on, or in the vicinity of, the Project site and stored in acceptable places. Partial payments will not exceed 90 percent of the Contract unit price for the item or the amount supported by copies of paid invoices, freight bills, or other supporting documents required by the Department. The quantity paid will not exceed the corresponding quantity estimate in the Contract. No partial payment will be made on living or perishable materials until incorporated in the Work.
- ii. When material payments exceed \$100,000 or 10 percent (10%) of the total contract amount, whichever is less, notarized copies of paid invoices or copies of canceled checks for all such materials must be submitted to the Department within 45 days of the end date of the estimate on which the material allowance was paid. Failure to provide such documentation will result in the deduction of such material allowance from future estimates until documentation is provided.
- iii. All material and work covered by partial payments made shall thereupon become the sole property of the Department, but this provision shall not be construed as relieving the Contractor of the sole responsibility of all materials and work upon which payments have been made or the restoration of any damaged work or as a waiver of the right of the State to require the fulfillment of all the terms of the Contract.
- H. Payment for Material Not on Hand:
- i. The Department will not pay for products and or materials that have not been delivered and stored properly on the construction site.
- I. Release of Claims:
- i. Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver a complete release of all claims arising under and by virtue of this Contract, including claims for all Subcontractors

and suppliers of either materials or labor, plus a release of the Contract Bond and a statement that all Subcontractors and suppliers have been paid. The Department, may pay any and all such claims, in whole or in part, and deduct the amount or amounts so paid from any partial or final payment.

J. Final Payment:

- i. Application for Final Payment received from the Contractor will be processed for payment not less than 60 days after project acceptance and final completion unless accompanied by a release of the Contract Bond. This payment shall be the amount of the Contract, amended by approved change orders, less previous payments minus liquidated damages, additional penalties or holdbacks. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

K. Acceptance of Final Payment Constitutes Release:

- i. The acceptance of the Final Payment by the Contractor shall be and shall operate as a release to the Contractor of all claims and of all liability to the Department for all things done or furnished in connection with this work. No payment, however, final or otherwise, shall operate to release the Contractor and its Sureties from any obligations under this Contract or the Contract Bond. Acceptance of Final Payment shall not impact any warranties provided by the Contractor with respect to this project.

11. LIMITATION OF CONSTRUCTION OPERATIONS

- A. The normal working hours will be from 7:00 am until 3:30 pm M-F unless otherwise agreed in writing by the department.
- B. The contractor may be displaced at any time with no notice in the event of a military mission that takes priority over construction.
- C. In the State of New Hampshire, legal holidays occur on:
 - a. New Year's Day
 - b. Washington's Birthday
 - c. Memorial Day Fourth of July
 - d. Labor Day
 - e. Veterans' Day
 - f. Thanksgiving Day and Day After
 - g. Christmas Day
 - h. Whenever a holiday is observed on a Friday or a Monday. The Contractor shall be required to suspend work for three (3) calendar days.
 - i. No work shall be performed on Saturday, Sundays or legal holidays except in cases of emergency and upon permission of the Department.

12. CONTRACTOR'S TITLE TO MATERIALS

- A. No materials or supplies for the work shall be purchased by the Contractor or any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies for which he accepts partial payment. If any claim is made with respect to materials provided by the contractor, subcontractors, or Independent Contractors, the Contractor shall defend any such claim and shall pay

any judgment or settlement thereon.

13. CHANGES IN WORK

- A. The Department may at any time, by a written order, and without notice to the Sureties, make changes in the Drawings and Specifications and Completion Date of this Contract and within the general scope thereof.
- B. The order shall stipulate the mutual agreed upon lump sum price, which shall be added to or deducted from the Contract Price. The Contractor shall furnish an itemized breakdown of the prices used in computing the value of any change that might be ordered.
- C. The compensation herein provided shall be accepted by the Contractor as payment in full, including superintendence, bond, overhead, and profit, for extra work performed on a force account basis. For all such work, the Contractor shall furnish certified copies of the payrolls on forms provided for that purpose, invoices of all materials, and such other information as may be required by the Department.

14. TAXES

- A. The Contractor shall pay all applicable Federal, State and Local sales and other taxes, except taxes and assessments on the real property comprising the site of the Project.

15. PATENTS

- A. The Contractor shall hold and save the Department and its officers, agents, servants, and employees harmless from liability of any nature including cost and expenses, for or on account of any patented or unpatented invention, process, article or applicable manufactured or used in the performance of the Contract, including its use, unless otherwise specifically stipulated in the Contract Documents.

16. ASSIGNMENTS

- A. The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder, without the written consent of the Department and of all Sureties executing any Bonds on behalf of the Contractor if in connection with said Contract.

17. SUPERINTENDENCE BY CONTRACTOR.

- A. The Contractor shall employ a competent Foreman or Superintendent, satisfactory to the Department, on the work site at all times to supervise the work in progress, with authority to act for him. The Contractor shall not change superintendents without permission from the Department and shall submit a request in writing with justification for such a change.
 - i. The superintendent shall be responsible for verifying that all materials, installation, coordination, and workmanship are in conformance with the contract documents.
 - ii. Unless the Department has granted prior written approval, the superintendent shall not, himself, engage in "hands on" construction work.
 - iii. In the event the superintendent fails or refuses to perform functions mentioned above as determined by the Department, the Contractor agrees to a stipulated

penalty of up to \$500.00 per day, in addition to any liquidated damages provided hereunder.

18. FAILURE TO COMPLETE WORK ON TIME

- A. If the Contractor fails to complete all of the work or sections of the Project, if sections are indicated, within the time specified in the Contract or within any additional time allowed, for each working day the Liquidated Damages identified in Section C below will be deducted from any money due the Contractor. This deduction will be made, not as a penalty, but as fixed, agreed liquidated damages for inconvenience to the Department and for reimbursing the Department the cost of the Administration of the Contract, including personnel, time, engineering and inspection. Should the amount of money otherwise due the Contractor be less than the amount of such liquidated damages, the Contractor and its Surety shall be liable to the Department for such deficiency.
- B. If the Department permits the Contractor to continue and finish the work after the time fixed for its completion, it shall in no way operate as a waiver on the part of the Department of any of its rights under the Contract. When the final acceptance has been duly made by the Department, any liquidated damage charges shall end.
- C. The fixed, agreed, liquidated damages shall be assessed in accordance with the following schedule.

<u>Original Contract Amount</u>		<u>Amount of Liquidated damages per day</u>
From more than:	to and including:	
0	25,000	\$200.00
25,000	50,000	\$300.00
50,000	100,000	\$400.00
100,000	500,000	\$500.00

19. SUBSTANTIAL COMPLETION AND FINAL INSPECTION

- A. When the Contractor believes the project is substantially complete they shall submit an application for substantial completion to the Department. The Contractor shall submit to the Department a list of items of work to be completed or corrected, accompanied by a cost value of these items. The Department will also provide a "punch List" of items to be completed based on their interpretation of the required finished product. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents. On the basis of an inspection by the Department which determines that the work is substantially complete, a certificate of Substantial Completion shall be issued which will establish the Date of Substantial Completion and state the responsibilities of the Department and the Contractor for such as security, maintenance, heat, utilities, damage to the work and insurance, any other pertinent issues and fix the time limit within which the Contractor shall complete the items listed herein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion unless otherwise provided in the Certificate of Substantial Completion.
- B. If the Contractor fails to proceed to complete the items on the "punch list," then in

addition to the corrective measures listed in the Certificate of Substantial Completion, the Department may use the monies still due the Contractor to have such items completed and the Contractor shall lose any claim to the monies so used.

- C. Upon written notice that the work is ready for final inspection and acceptance, the Department shall promptly make such inspection, and when they find the work acceptable under the Contract Documents and the Contract fully performed, the Contractor will be provided written notice to that effect. The Contractor shall provide all certificates and reports, as required, throughout the contract and shall coordinate their preparation and submission. Failure to submit such certificates and reports shall be considered default of contract.

20. TERMINATION OF CONTRACT WITH FAULT

A. If the Contractor:

- i. Fails to begin work under Contract within the time specified in the notice to proceed, or
- ii. Fails to perform the work with sufficient workmen and equipment, or with sufficient materials to assume prompt completion of said work, or
- iii. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or
- iv. Discontinues the prosecution of the work, or
- v. Fails to resume work, which has been discontinued, within a reasonable time after notice to do so, or
- vi. Becomes insolvent or has declared bankruptcy, or commits any act of bankruptcy or insolvency, or
- vii. Fails to pay subcontractors and material/product suppliers, or
- viii. Makes an assignment for the benefit of creditors, or
- ix. For any other causes whatsoever, fails to carry on the work in an acceptable manner.

B. The Department will give notice, in writing, to the Contractor and his Surety for such delay, neglect, and default for any item identified above.

- i. If the Contractor or Surety does not proceed in accordance with the Notice, then the Department will, upon the Contractor's failure to comply with such Notice, have full power and authority without violating the Contract, to take the prosecution of the work out of the hands of the Contractor. The Department may enter into an agreement for the completion of said Contract according to the terms and conditions thereof, or use such other methods as in his opinion will be required for the completion of said Contract in an acceptable manner.
- ii. All extra costs and charges incurred by the Department as a result of such delay, neglect or default, together with the cost of completing the work under the Contract will be deducted from any monies due or which may become due said Contractor. If such expenses exceed the sum that would have been payable under the Contract, then the Contractor and the Surety shall be liable and shall pay to the Department, the amount of such excess.

21. TERMINATION OF CONTRACT WITHOUT FAULT

- A. Except in cases controlled by the preceding section, the Department, for any cause, including, but not limited to an order of any Federal authority or petition of the Contractor due to circumstances beyond his control may by written notice to the Contractor and the Surety terminate the Contract or any portion thereof subject to the Condition(s) i, ii, iii and iv provided below.
- B. Notwithstanding anything to the contrary contained in these condition, it is understood and agreed by the parties hereto that all obligations of the Department hereunder, including the continuance of payments, are contingent upon the availability and continued appropriation of State and/or Federal Funds, and in no event shall the Department be liable for any payments hereunder in excess of such available or appropriated funds. In the event of a reduction, termination or failure to appropriate any or all such available funds or appropriations or a reduction of expenditures of State funds the Department may, by written notice to the Contractor and Surety, immediately terminate this Contract in whole or in part in accordance with the following conditions:
- i. When a Contract, or portion thereof, is terminated before completion of all items of work in the Contract, payment will be made for the actual items of work completed. Payment of items of work not completed at time of termination shall be the greater of the following amounts: (1) a percentage of the Contract unit price, which percentage shall be the percentage of completion of the particular item at time of termination or (2) such amount as shall be mutually agreed upon by the parties. No claim for loss of anticipated profits on items or units of work not completed will be allowed.
 - ii. Reimbursement for organization of the work and mobilization, when not otherwise included in the Contract, shall be made where the volume of work completed is too small to compensate the Contractor for these expenses under the Contract; the intent being that an equitable settlement be made with the Contractor.
 - iii. Acceptable materials, obtained or ordered by the Contractor for the work, and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor based upon the delivered cost of the materials at such points of delivery as may be designated by the Department. The Contractor shall do everything possible to cancel unfilled orders.
 - iv. Termination of a Contract, or a portion thereof, shall not relieve the Contractor of his responsibilities for the work completed nor shall it relieve his Surety of its obligations for and concerning any claims arising out of the work performed.

22. ASSIGNMENT PROVISION

- A. The Contractor hereby agrees that it will assign to the Department all causes of action that it may acquire under the anti-trust laws of New Hampshire and the United States as a result of conspiracies, combinations or contracts in restraint of trade which affect the price of goods or services obtained by the Department under this Contract, if so requested by the Department.

END OF SECTION

INSTRUCTIONS TO BIDDERS

1. DEFINITIONS

- A. The term "Consultant" means the registered Professional Architect or Engineer engaged to develop Plans and Specifications for the Project.
- B. The term "Department" means The Department of Military Affairs and Veterans Services acting directly or through an authorized representative.
- C. The term "Contractor" means the party of the second part to the Contract, acting directly or through an authorized lawful agent or employee. The Specifications may be divided into separate headings or divisions to cover various trades in the work, and where trade Contractors are referred to, it has been for convenience only.
- D. The terms "Plans" and "Drawings" shall be synonymous.
- E. The term "provide" means to furnish and install a product, materials, systems, and/or equipment, complete in place, fully tested and approved.
- F. Wherever the term "Architect" is used throughout the Technical Specifications, it shall be understood to mean the "Consultant".
- G. The term "Notice" as used herein shall mean and include all written notices, demands, instructions, claims, approvals, and disapprovals required to obtain compliance with Contract requirements. Any written notice by either party to the Contract shall be sufficiently given if delivered to or at the last known business address of the person, firm, or corporation constituting the other party to the Contract, or to his, their, or its duly authorized agent, representative, or officer, or when sent by registered mail to such last known business address.

2. PREPARATIONS AND SUBMISSION OF BIDS

- A. The Bidder is required to bid on all items called for in the Proposal which may include Alternates. For Alternate pricing the Bidder shall set forth in the space provided the amount to be added to or deducted from the Base Bid. If an alternate price called for does not involve a change in price, the Bidder shall so indicate by writing the words "no change" in the space provided.
- B. Bids shall be submitted upon the Proposal Form furnished and shall be signed. The Bidder shall specify a unit price, both in words and figures, for each item called for in this Proposal. All of the words and figures shall be in ink or typed. If a unit price or a lump sum already entered by the Bidder on the Proposal Form is to be altered, it should be crossed out with ink, the new unit price or lump sum bid entered above or below it and initialed by the Bidder: also in ink. In case of discrepancy between the prices written in words and those written in figures, the prices written in words shall govern. Bids containing any conditions, omissions, unexplained erasures or alterations, or items not called for in the Proposal or irregularities of any kind may be rejected by the Department as being incomplete.
- C. Bids may be submitted electronically to the bidding officer (as noted in the invitation to bid) If the selected bidder submits electronically the original documents will be required to be submitted to the department.

- D. Each bid must contain the full business address of the Bidder and be signed with a legally defining signature. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership named by one of the members of the partnership or by an authorized representative, followed by the designation of the person signing. Bids by corporation must be signed with the legal name of the corporation, followed by the name of the State of incorporation and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. A bid by a person who affixes to his signature, the word "President," "Secretary," "Agent" or other designation, without disclosing his principal, may be held to the bid of the individual signing. When requested by the Department, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished.
3. RECEIPTS AND OPENING OF BIDS
- A. Bids will not be opened publicly. The bidding officer (as noted in the Invitation to Bid), whose duty it is to open the bids, will decide when the specified time has arrived and no bid received or presented thereafter will be considered. No responsibility or liability will be attached to any officer for the premature opening of a bid not properly addressed and identified.
- B. Bids sent by telephone and or fax will not be considered.
4. WITHDRAWAL OF BIDS
- A. Bids may be withdrawn upon written request received from Bidders prior to the time fixed for opening. Negligence on the part of the Bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.
5. CONDITIONS AT SITE OR BUILDING
- A. Bidders shall have the option of visiting the site or building of the referenced project prior to the bid due date. Bidders will ONLY be allowed to visit the site at the published date and time in the "Request for Bid". These are active military installations and unscheduled site visits are not authorized. Whether or not a contractor attends a site visit, their bid is a statement that they have ascertained pertinent local conditions; such as location, accessibility and general character of the site or building, the character and extent of existing work within or adjacent to the site, and any other work being performed thereon at the time of the submission of his bid.
6. EXPLANATION TO BIDDERS
- A. No oral explanation in regard to the meaning of the Drawings and Specifications will be made and no oral instructions will be given before the award of the Contract. Discrepancies, omissions or doubts as to the meanings of Drawings and Specifications shall be communicated in writing to the Department for interpretation. Bidders should act promptly and submit all questions to the Department no later than five (5) days before the date set for the bid submission. Any interpretations made will be in the form of an addendum to the Bidding Documents that will be forwarded to all

Bidders of record by the Department.

7. REJECTION OF BIDS

- A. The Department reserves the right to reject any or all bids, to waive technicalities or to advertise for new bids, if in its judgment, the best interests of the State will be promoted thereby. The Department reserves the right to reject the bid of a Bidder who is not in a position to perform the Contract.

8. CONTRACT SECURITY

- A. The successful Bidder, at the time of the execution of the Contract, must deposit with the Department, Surety in the sum equal to one hundred percent (100%) of the amount of the Contract as required by RSA 447:16. The form of Bond shall be that provided for by the Department and the Surety shall be acceptable to the Department. The Contract Bond must be written by a Company licensed to do business in New Hampshire at the time the policy is issued. In addition, the Company issuing the bond shall be listed on the current list of "Surety Companies Acceptable on Federal Bonds" as published by the Treasury, Financial Management Services, and Circular Number 570.

9. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

- A. The Contractor shall deliver to the Department at the time of execution of the Contract; certificates of all insurance required hereunder and such insurance shall be reviewed prior to approval by the Attorney General. The certificates of insurance shall contain the description of the Project, and shall state that the companies issuing insurance will mail to the Department ten (10) days notice of cancellation, alteration of material change of any listed policies. The Contractor shall keep in force the insurance required herein for the period of the Contract. At the request of the Department, the Contractor shall promptly make available a copy of any and all listed insurance policies. The required insurance must be written by a Company licensed to do business in the State of New Hampshire at the time the policy is issued. In addition, the company must have a rating of no less than B+ based on the current A.M. best rating guide.
- B. The Contractor shall require each Subcontractor employed on the Project to maintain the coverage listed below unless the Contractor's insurance covers activities of the Subcontractor on the Project.
- C. No operations under this Contract shall commence until certificates of insurance attesting to the below listed requirements have been filed with the Department, approved by the Attorney General, and the Contract approved by the Governor and Council.
- i. Workers' Compensation in accordance with the State of New Hampshire statutory.
 - a. Employers Liability:
 - \$100,000 Each accident;
 - \$500,000 Disease-policy limits;
 - \$100,000 Disease-each employee
 - ii. Commercial General Liability;

- a. Occurrence Form, to include Contractual Liability (see Indemnification Clause), Explosion, Collapse, and Underground coverages.

Limits of Liability:

\$1,000,000 Each Occurrence Bodily Injury & Property Damage;

\$2,000,000 General Aggregate -- Include Per Project Aggregate

Endorsement;

\$2,000,000 Products/Completed Operations Aggregate

OR

- iii. Commercial General Liability Form; to include Premises/Operations, Independent Contractors, Products/Completed Operations, Personal Injury, Contractual Liability (see Indemnification Clause 11). Collapse and Underground, Medical Payment coverage's (Broad Form Comprehensive GL Endorsement)

Limits of Liability:

\$1,000,000 Combined Single Limit of Liability for Bodily Injury & Property Damage

- iv. NOTE: If blasting and/or demolition are required by the contract, the Contractor or subcontractor shall obtain the respective coverage and shall furnish to the Department a Certificate of Insurance evidencing the required coverage's prior to commencement of any operations involving blasting and/or demolition.

- v. Owner's Protective Liability coverage for the benefit of The Adjutant General's Department.

Limits of Liability:

\$1,000,000 Combined

\$1,000,000 Aggregate

- vi. Commercial Automobile Liability covering all motor vehicles including owned, hired, borrowed, and non-owned vehicles.

Limits of Liability:

\$1,000,000 Combined Single Limit for Bodily Injury & Property Damage.

- vii. Commercial Umbrella Liability

Limits of Liability:

\$1,000,000 Each Occurrence

\$1,000,000 Aggregate

- viii. Builder's Risk Insurance (Fire and Extended Coverage):

The Contractor shall insure the work included in the Contract on an "All Risk" basis, on one hundred percent (100%) completed value basis of the contract. Builder's Risk coverage shall include materials located on-site, in-transit, and at any temporary site. The policy by its own terms or by endorsement shall specifically permit partial or beneficiary occupancy prior to completion or acceptance of the entire work. The policies shall be in the names of the State Agency and the Contractor. The policies shall provide for the inclusion of the names of all other Contractors, Subcontractors, and others employed on the premises as

insureds. The policies shall stipulate that the insurance companies shall have no right of subrogation against any Contractors. Subcontractors or other parties employed on the premises.

ix. Indemnification:

The Contractor shall indemnify, defend, and save harmless the State of New Hampshire and its agents and employees from and against any and all claims, liabilities, suits or penalties arising out of (or which may be claimed to arise out of) acts or omissions of the Contractor or subcontractors in the performance of work covered by the contract. This covenant shall survive the termination of the contract. Notwithstanding, the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the State, which immunity is hereby reserved by the State.

10. BIDDING DOCUMENTS

- A. Bidders shall use only complete sets of bidding documents in preparation of bids: the Department assumes no responsibility for mistakes due the use of incomplete bidding documents.

11. SUBSTITUTIONS

- A. Where the bidding documents stipulate particular products, substitution requests will ONLY be considered before receipt of bids.

12. AWARD OF CONTRACT

- A. The Contract will be awarded as soon as possible to the lowest Qualified Bidder on the basis of Base Bid Lump Sum Price/Lump Sum Grand Total, as applicable.
B. The Department reserves the right to waive any informality in bids received, if in the best interest of the State of New Hampshire.
C. Each Bidder shall be prepared, if so requested by the Department, to present evidence of his experience, qualifications, and financial ability to carry out the terms of the Contract.
D. In the event of a tie, the owner reserves the right to select the apparent lowest Qualified Bidder of his choice.

13. PERMITS AND FEES.

- A. The selected Contractor is to obtain and pay for all construction licenses, permits, and fees as may be required by law for construction of State's facility, and pay for all fees and charges, and use of the property other than the site of the work for storage of materials or other purposes.
B. The selected Contractor is to pay all applicable Federal, State, and Local sales and other taxes, except taxes, and assessments on the real property comprising the site of the Project.

END OF SECTION

PRICE AND PAYMENT PROCEDURES

1. REQUISITION FOR PAYMENT

- A. Submit one copy electronically of each application on the AIA Application and Certificate for Payment G702 and Continuation sheet G703 or another document/form that has been previously approved by the Department.
- B. Content and Format: Items on the Requisition for Payment shall be consistent with the items on the Proposal Form. Utilize the Schedule of Values as documentation for payment items.
- C. Submit updated construction schedule with each Requisition for Payment.
- D. Payment Period: Submit at intervals stipulated in the General Conditions.
- E. Submit with transmittal letter to the attention of the project Architect/Engineer for review and approval.
- F. Substantiating Data: When the Department requires substantiating information, submit data justifying dollar amounts in question.

2. SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702 or approved equal. (See item 1.A above)
- B. Submit Schedule of Values within 15 days after date of issuance of Notice to Proceed. Failure to submit within specified time period will constitute Default of Contract.
- C. Format: Utilize Table of Contents of these specifications. Identify each line item with number and title of major specification section. Identify bonds, insurance, general conditions, allowances etc.
- D. Include a separate line item for closeout to include record drawings, owner's manuals and other pertinent information due to the Department.
- E. Include a separate line item for the amount of each Allowance and Alternates specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- F. Revise schedule to list approved Change Orders, with each Requisition or Payment.

3. UNIT PRICES

- A. Authority: Measurement methods are delineated in individual specification sections.
- B. Measurement methods delineated in individual specification sections complement criteria of this section. In event of conflict, requirements of individual specification section govern,
- C. Take measurements and compute quantities. Architect/Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment

- i. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at unit sum/prices contracted.
- D. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of item of the Work; overhead and profit,
- E. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Architect/Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.
- F. Measurement of Quantities: Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- G. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- H. Measurement by Area: Measured by square dimension using mean length and width or radius.
- I. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
- J. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

4. CHANGE PROCEDURES

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Department will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time, or that may be necessary to carry out the work included in the Contract, by issuing Supplemental Instructions.
- C. The Department may issue a Proposal Request including a detailed description of proposed changes with supplementary or revised Drawings and specifications, with or without a change in Contract Time for executing the change. The Contractor will prepare and submit estimate within ten days.
- D. Contractor may propose changes by submitting a request for change(s) to the Department, describing proposed change and its full effect on the Work. Each request shall be a separate item and sequentially numbered. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.
- E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by the Department. Submit the breakdown of the following items on a Department Change Order Form for review and approval by the Department:
 - i. The Contractor shall include the following indirect costs for work performed by the General Contractor as part of the Contractors' price:
 - a. Worker's Compensation and Employee Liability.
 - b. Unemployment and Social Security Taxes.

- ii. In addition to the above indirect costs the General Contractor shall be allowed the following markups:
 - a. Twenty percent (20%). Said twenty percent (20%) shall be all inclusive for overhead, supervision, and profit for Work performed by the General Contractor.
 - b. Ten percent (10%) on that part of work performed by all Subcontractors.
 - iii. On any change that involves a net credit to the State, no allowance for overhead, supervision and profit shall be figured.
 - iv. Contractor shall provide back-up information for all change order pricing.
 - v. Extension of Contract Time: State any requests for extension of Contract Time with justification for such a request.
- F. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- G. Construction Change Directive: The Department may issue a directive instructing the Contractor to proceed with changes in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change. Failure to comply will result in Default of Contract.
- H. Time and Material Change Order: Submit itemized account and supporting data within 10 days of completion of change. The Department will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- i. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- I. Execution of Change Orders: The Contractor is responsible for preparing and updating a spreadsheet log itemizing all Proposed Changes. A separate spreadsheet shall be completed for each Allowance Item. The spreadsheet shall include columns for Proposed Change Number, Description, Amount of Change, Status, and Approved Amounts. In addition a current balance remaining shall be included. Change Orders will be processed per the following procedures:
- i. The Department reviews cost for Change in Work. If needed the Department will request additional items, back-up information, and request any possible changes or clarifications.
 - ii. Contractor can proceed with Change Order Work with direction from the Department.
 - iii. Contractor shall not proceed with any work that will exceed the amount of Allowance remaining.
 - iv. Fully signed and executed Change Order is issued by the Department to the Consultant and Contractor.
- J. Correlation Of Contractor Submittals:
- i. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract

Sum/Price.

- ii. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- iii. Promptly enter changes in Project Record Documents.

5. DEFECT ASSESSMENT

- A. Any work or materials found to be defective or not in compliance with the plans and specifications in the determination of the Department shall be handled in the following manner.
- B. Replace the Work, or portions of the Work, not conforming to specified requirements.
- C. If, in the opinion of the Department, it is not practical to remove and replace the Work, the Department will direct appropriate remedy or adjust payment.
- D. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of the Department.
- E. Defective Work will be repaired to instructions of and acceptance by the Department and unit sum/price will be adjusted to new sum/price at discretion of the Department.
- F. Authority of the Department to assess defects and identify payment adjustments, is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
 - i. Products wasted or disposed of in a manner that is not acceptable.
 - ii. Products determined as unacceptable before or after placement.
 - iii. Products not completely unloaded from transporting vehicle.
 - iv. Products placed beyond lines and levels of required Work.
 - v. Products remaining on hand after completion of the Work.
 - vi. Loading, hauling, and disposing of rejected products.

6. ALTERNATES

- A. Alternates quoted on Proposal Forms will be reviewed and accepted or rejected at the Department's discretion. Accepted Alternates will be identified in the Department - Contractor Agreement.
- B. Coordinate related work and modify surrounding work.

7. ALLOWANCES

- A. Allowances: If included in the Contract, a stipulated amount of funding for use only upon the Department's instruction. An allowance will make money available for modifications and/or additions to contract items due to owner initiated changes, unforeseen conditions, for unknown, latent or differing existing conditions, for testing of hazardous materials or for the removal of hazardous materials, asbestos, lead, mercury, sealant etc. that are encountered by construction
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from an Allowance. The cost of the bond for the amount of Allowance shall be included as part of the lump sum base bid.

- C. Funds will be drawn from an Allowance only by Change Order. Contractor can proceed with Change Order Work against Allowance with direction from the Department. The Contractor shall not proceed with any work that will exceed the amount of Allowance remaining.
 - D. Notwithstanding the Contractor's objection, the Department may at any time reduce the funds remaining in the Allowance by Change Order.
 - E. At Final Payment of the Contract, funds remaining in the Allowance will be credited to the Department.
8. TESTING AND INSPECTION
- A. Testing and Inspecting: Cost to engage testing and inspecting agency; execution of tests and inspecting; and reporting results are to be paid by the Contractor.
 - B. Testing as required by plan and specification shall be performed by an independent certified testing agency that may not be a subsidiary or employee of the Contractor.
 - C. Contractor shall make all testing information readily available to the Department for review before proceeding to the next phase of any such tested work.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

I. SUBMITTAL PROCEDURES

- A. Submittals shall be made for all materials to be used in construction of the project for review and acceptance of the Department PRIOR to installation of said materials.
- B. The word "Submittals" shall include all products and materials that will become part of the finished product whether or not they are specified in the construction documents. This shall also include any shop drawings that need to be approved for any kind of layout of installation. (i.e.: Rebar, steel fabrication, etc...)
- C. Shop drawings will be reviewed for the limited purpose of checking for conformance with information given and design concept expressed in the contract documents.
- D. Contractor to indicate any special utility and/or electrical characteristics, utility connection requirements; and location of utility outlets for service for functional equipment and appliances on shop drawings as applicable.
- E. Transmit each submittal electronically via e-mail with a cover sheet and all pertinent information for review to the Department and the Department's Consultant simultaneously. Schedule submittals to expedite the Project.
- F. Sequentially number transmittal forms and separate items logically. Mark revised submittals with original number and sequential alphabetic suffix.
- G. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- H. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents. Incomplete items or items submitted without the Contractor's signed stamp of approval thereon will be returned rejected.
- I. For each submittal for review, allow 14 days excluding delivery time to and from Architect, Engineer and the Department and Contractor.
- J. The Department and the Department's Consultant will review submittals and coordinate return of same to the Contractor.
- K. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- L. Allow space on submittals for Contractor and Architect or Engineer review stamps.
- M. When revised for resubmission, identify changes made since previous submission.
- N. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

- O. Work shall not begin until submittal items have been approved and returned to General Contractor by the Department.
- P. Contractor shall keep a binder on site of all approved submittals for review by the Department and their consultants at any time during construction.

2. CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedule at Preconstruction Meeting.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of revised schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Submit horizontal bar chart with separate line for each section of Work, identifying first work day of each week.

3. SAMPLES

- A. Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples For Selection as specified in individual specification sections or as noted on plans:
 - i. Submit to the Department for aesthetic, color, or finish selection.
 - ii. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for the Department and Architect/Engineer selection.
- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices, Coordinate sample submittals for interfacing work.
- D. Include identification on each sample with full Project information.
- E. Submit number of samples specified in individual specification sections; the Department will retain one sample and Architect or Engineer will retain one sample.
- F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

4. TEST REPORTS

- A. Submit for Department and Architect and Engineer's knowledge as required per plans or individual specification sections.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

5. CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor, to the Department in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Department.

6. MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to the Department in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention and special environmental criteria required for application or installation.

7. CONSTRUCTION PHOTOGRAPHS

- A. Provide photographs of site and construction throughout progress of Work.
- B. Contractor will NOT take any photographs of military personnel or equipment.
- C. Contractor will NOT use any project photographs for any reason other than stated in this section without prior written consent of the Department.
- D. Each month submit photographs with Application for Payment.
- E. Photographs: Submit digital images on compact discs.
- F. In addition to progress photos, contractor is to take four site photographs from differing directions and four interior photographs of each building area indicating relative progress of the work, five days maximum, prior to submitting.
- G. Take photographs as evidence of existing project conditions.
- H. Identify each image, identify name of Project, orientation of view, date and time of view.

END OF SECTION

TEMPORARY FACILITIES AND CONTROLS

1. **TEMPORARY ELECTRICITY**
 - A. The Department will pay cost of energy used. Exercise measures to conserve energy.
 - B. Provide power outlets, with branch wiring and distribution boxes as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
 - C. Provide main service disconnect and over-current protection at convenient location, if required.
 - D. Permanent convenience receptacles may be utilized during construction.
2. **TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**
 - A. Provide and maintain lighting for construction operations.
 - B. Provide and maintain lighting to interior work areas after dark for security purposes.
 - C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
 - D. Maintain lighting and provide routine repairs.
 - E. Permanent building lighting may be utilized during construction.
3. **TEMPORARY HEATING**
 - A. Existing building heating system may be used during construction. Exercise measures to conserve energy.
4. **TEMPORARY COOLING**
 - A. Existing building cooling system may be used during construction. Exercise measures to conserve energy.
5. **TEMPORARY VENTILATION**
 - A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
 - B. Provide temporary fan units as required to maintain clean air for construction operations.
6. **TELEPHONE SERVICE**
 - A. Contractor shall not use existing phone service in the building.
 - B. Contractor shall provide 24 hour call list to the department in case of emergencies.
7. **WATER SERVICE**
 - A. The Department will pay cost of temporary water used. Exercise measures to conserve energy. Utilize Department's existing water system, extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.
8. **TEMPORARY SANITARY FACILITIES**
 - A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of project mobilization.
9. **FIELD OFFICES AND SHEDS**

- A. Do not use existing facilities for field offices or for storage.
- B. Provide Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors. Maintain during progress of Work; remove at completion of Work.
- C. Storage Areas And Sheds: Size to storage requirements fill products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products.
- D. Maintenance and Cleaning: Maintain approach walks free of mud, water, and snow.
- E. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

10. VEHICULAR ACCESS

- A. All contractor employees and sub-contractors driving onto the State Military Reservation (SMR) are required to show a current driver's license to security.
- B. The speed limit on the SMR is 15 MPH.
- C. Provide unimpeded access for emergency vehicles. Provide and maintain access to fire hydrants and control valves free of obstructions.

11. PARKING

- A. Contractor shall limit parking of employees and sub-contractors to areas as designated by the department project manager.

12. PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

13. BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas to allow for the Department's use of the site and facility, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

14. ENCLOSURES

- A. Construction: Interior Enclosures:
 - i. Provide temporary partitions and ceilings as indicated on Drawings to separate work areas from Department occupied areas, to prevent penetration of dust and moisture into Department occupied areas, and to prevent damage to existing materials and equipment.
 - ii. Construction: Framing with reinforced polyethylene and plywood sheet materials with closed joints and scaled edges at intersections with existing surfaces.

15. SECURITY

- A. Security Program:

- i. Protect new Work and existing premises from theft, vandalism, and unauthorized entry.
- B. Entry Control.
 - i. Restrict entrance of persons and into Project site and existing facilities,
 - ii. Allow entrance only to authorized persons with proper identification.
 - iii. Maintain log of workers and visitors, make available to Department on request.
- C. Personnel Identification
 - i. Maintain list of accredited persons, submit copy to Department on request.
 - ii. A driver's license or other acceptable positive identification will be required.

16. DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
- C. After completion of work, clean all interior work surfaces.

17. POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

18. RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

19. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment.
- B. Remove underground installations. Grade site as indicated on Drawings.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

1. CLOSEOUT PROCEDURES

- A. Submit a signed Substantial Completion Application attesting that the Contract Documents have been reviewed, Work has been inspected, and that all Work is complete in accordance with Contract Documents and ready for the Department review.
- B. Only after completion of all Punch List items and submission of all items the Contractor shall submit a Final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

2. FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned. Clean new light fixtures free from dust, dirt and finger prints.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, roof drains, downspouts, and drainage systems.
- F. Clean site, sweep paved areas, rake landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from site.

3. STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify the Department seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Execute start-up under supervision of applicable manufacturer's representative and Contractors' personnel in accordance with manufacturer's instructions.

H. Submit a written report stating that the equipment or system has been properly installed and is functioning correctly.

4. DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products and equipment to Department personnel prior to date of Substantial Completion at mutually agreed time.
- B. For equipment or systems requiring seasonal operation, schedule and perform demonstration for other season within six months with department personnel.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with the Department personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at designated location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. Required instruction time for each item of equipment and system is specified in individual sections.

5. TESTING, ADJUSTING AND BALANCING

- A. Contractor will appoint and employ services of independent firm to perform testing, adjusting and balancing of systems and equipment, if required.
- B. Independent firm will perform services specified.
- C. Reports will be submitted by independent firm to the Department indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

6. PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

7. PROJECT RECORD DOCUMENTS

- A. Maintain on-site one set of the following record documents; record actual revisions to the Work:
 - i. Drawings.
 - ii. Specifications.
 - iii. Addenda.

- iv. Change Orders and other modifications to the Contract.
 - v. Reviewed Shop Drawings, Product Data, approved submittals and Samples.
 - vi. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure data is complete and accurate, enabling future reference by the Department.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
- i. Manufacturer's name and product model and number.
 - ii. Product substitutions or alternates utilized.
 - iii. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
- i. Measured depths of foundations in relation to finish floor datum.
 - ii. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - iii. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - iv. Field changes of dimension and detail.
 - v. Details not on original Contract drawings.
 - vi. Contractor to provide record drawings in AutoCad or Revit format compatible with current Department software as well as in PDF format.
 - vii. Contractor to supply two (2) full size paper sets of record drawings to Department.
- G. Submit documents to the Department prior to final payment and release of retainage.
- 8. OPERATION AND MAINTENANCE DATA**
- A. Submit data bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers. (2 complete copies of all materials required.) Additionally provide all the same data in PDF format on a compact disc (CD)
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
- i. Part I: Directory, listing names, addresses, and telephone numbers of Architect/Engineers), Contractor, Subcontractors, and major equipment suppliers.
 - ii. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.

- b. List of equipment:
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods, materials and schedules, and special precautions identifying detrimental agents.
- iii. Part 3: Project documents and certificates, including the following as required:
- a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals and Photocopies of warranties and bonds.

9. MANUAL FOR MATERIALS AND FINISHES

- A. Submit one copy of preliminary draft or proposed formats and outlines of contents before start of Work. The Department will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by the Department, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes prior to Substantial Completion. Draft copy be reviewed and returned with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes in final form prior to final inspection.
- E. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
- F. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- G. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- H. Additional Requirements: As specified in individual product specification sections.
- I. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

10. MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Contract Administrator will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by the Department, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to Substantial Completion. Draft copy shall be reviewed and returned after Substantial Completion, with

Architect/Engineer comments. Revise content of document sets as required prior to final submission.

- D. Submit two sets of revised final volumes in final form prior to final inspection.
- E. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- F. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed and/or by label machine.
- G. Include color coded wiring diagrams as installed.
- H. Operating Procedures: Include stall-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- I. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- J. Include servicing and lubrication schedule, and list of lubricants required.
- K. Include manufacturer's printed operation and maintenance instructions.
- L. Include sequence of operation by controls manufacturer.
- M. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- N. Include control diagrams by controls manufacturer as installed.
- O. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- P. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Q. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- R. Include test and balancing reports as specified in Section 01400.
- S. Additional Requirements: As specified in individual product specification sections.
- T. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

11. SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed by State; obtain receipt prior to final payment.

12. PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after Substantial Completion. All warranties start dates shall be the Substantial Completion Date, if project is phased all warranties to start at the date of Substantial Completion of each phase.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
 - i. For equipment or component parts of equipment put into service during construction with State's permission, submit documents within ten days after acceptance.
 - ii. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
 - iii. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date or acceptance as beginning or warranty or bond period.

13. MAINTENANCE SERVICE

- A. Furnish service and maintenance of components indicated in specification sections during warranty period.
- B. Examine system components at frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by manufacturer of original component.
- D. Do not assign or transfer maintenance service to agent or Subcontractor without prior written consent of the Department.

14. GUARANTEE OF WORK

- A. Except as otherwise specified, all work shall be guaranteed by the Contractor against defects resulting from the use of inferior materials, equipment or workmanship for one (1) year from the Date of Substantial Completion of the work.
- B. If, within any guarantee period, repairs or changes are required in connection with guaranteed work, which in the opinion of the Department, is rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract shall, promptly upon receipt of notice from the Department and at his own expense:
 - i. Place in satisfactory condition in every particular, all such guaranteed work, correct all defects therein.
 - ii. Make good all damage to the building or site, or equipment or contents thereof; which in the opinion of the Department is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract.
 - iii. Make good any work or material, or the equipment and contents of said building or site disturbed in fulfilling any such guarantee.

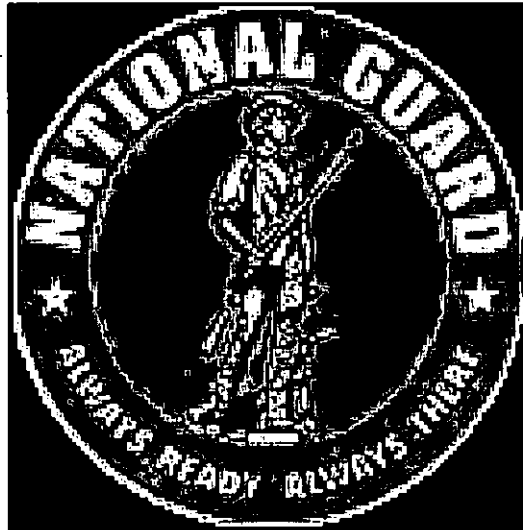
- C. In any case, wherein fulfilling the requirements of the Contract or of any guarantee, embraced in or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Department and guarantee such restored work to the same extent as it was guaranteed under such other contracts.
- D. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Department may have the defects corrected and the Contractor and his/her Surety shall be liable for all expense incurred.
- E. All special guarantees applicable to definite parts of the work that may be stipulated in the Specifications or other papers forming a part of the Contract shall be subject to the term of this paragraph during the first year of the life of such special guarantee.
- F. Failure to adhere to guarantee terms may result in suspension or barring from the prequalification list, or, alternatively, the requirement of a Letter of Credit or other guaranty equal to a percentage of the Contract amount.

END OF SECTION

PROJECT MANUAL
SMR BUILDING "C" LATRINE RENOVATIONS

**NEW HAMPSHIRE ARMY NATIONAL GUARD
1 MINUTEMAN WAY
CONCORD, NEW HAMPSHIRE**

BID AND CONSTRUCTION DOCUMENTS



TTG PROJECT No. 5038

APRIL 14, 2021

The H.L. Turner Group Inc.

ARCHITECTS • ENGINEERS • BUILDING SCIENTISTS

NHARNG – CONCORD SMR BUILDING "C" LATRINE RENOVATIONS

NEW HAMPSHIRE ARMY NATIONAL GUARD
1 MINUTEMAN WAY
CONCORD, NH 03301

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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.
- B. Related Requirements:
 - 1. Section 011000 “Summary” for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 017300 “Execution” for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged, or removed and reinstalled.
- B. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 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. Interruption of utility services. Indicate how long utility services will be interrupted.
 2. Coordination for shut-off, capping, and continuation of utility services.
 3. Coordination of Owner's continuing occupancy of existing building.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. 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.
- 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY, SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
 - 2. Arrange to shut-off indicated equipment with Owner.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3.4 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.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Remove damaged, decayed, wet, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 4. Dispose of demolished items and materials promptly.
- B. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 033053

MISCELLANEOUS CAST-IN-PLACE CONCRETE

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 cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. Comply with the following sections of ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents:
 - 1. “General Requirements.”
 - 2. “Formwork and Formwork Accessories.”
 - 3. “Reinforcement and Reinforcement Supports.”
 - 4. “Concrete Mixtures.”
 - 5. “Handling, Placing, and Constructing.”
- B. Comply with ACI 117 (ACI 117M).

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I/II.
- C. Normal-Weight Aggregate: ASTM C 33/C 33M, 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
- E. Water: ASTM C 94/C 94M.

2.4 FIBER REINFORCEMENT

- A. Synthetic Macro-Fiber: 1-1/2 inches (38 mm) long, minimum.

2.5 RELATED MATERIALS

- A. Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick; or plastic sheet, ASTM E 1745, Class C.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class-B.

2.7. CONCRETE MIXTURES

- A. Comply with ACI 301 (ACI 301M).
- B. Normal-Weight Concrete:
 - 1. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Slump Limit: 4 inches (100 mm) or 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
 - 4. Air Content: Maintain within range permitted by ACI 301 (ACI 301M). Do not allow air content of trowel-finished floor slabs to exceed 3 percent.
- C. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd. (2.4 kg/cu. m).

2.8. CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301 (ACI 301M).

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended adhesive or joint tape.

3.4 STEEL REINFORCEMENT INSTALLATION

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-(3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 301 (ACI 301M) for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
- C. Consolidate concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
- D. Slab Infills:
 - 1. Coordinate sizes and locations of concrete infills with trades.
 - 2. Construct concrete slab to 4 inches (100 mm) thick (minimum) unless otherwise indicated.
 - 3. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
 - 4. Install dowel rods to connect new and existing concrete slabs. Unless otherwise indicated, install #4 dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base. Drill and epoxy into the existing slabs.

5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.7 FINISHING FORMED SURFACES

- A. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 1. Do not further disturb surfaces before starting finishing operations.
- C. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- C. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to

heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301 (ACI 301M).
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Preservative treated wood materials.
- B. Miscellaneous framing.
- C. Concealed wood blocking, nailers, and supports.
- D. Miscellaneous wood nailers, furring, and grounds.

1.2 REFERENCE STANDARDS

- A. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Protection Association; 2007.
- B. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.
- C. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002.

1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.
- D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.2 DIMENSION LUMBER

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB) for Southern Pine. Northeastern Lumber Manufacturers Association (NELMA) and National Lumber Grades Authority (NLGA) for Spruce-Pine-Fir.
- C. Sizes: Nominal sizes as indicated on drawings, S4S.
- D. Moisture Content: S-dry or MC19.

2.3 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.4 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft (4.0 kg/cu m) retention.

- a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with masonry or concrete.
2. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft (6.4 kg/cu m) retention.
- a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims; bracing; and blocking.

3.3 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.
- E. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.4 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.5 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

END OF SECTION

SECTION 064116

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.

B. Related Requirements:

1. Section 061000 "Rough Carpentry"
2. Section 123661 "Solid Surfacing Countertops & Interior Window Sills"

1.2 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply AWI Quality Certification Program label to Shop Drawings.

- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.

- D. Samples for Initial Selection: For each type of exposed finish.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
- B. Architectural Woodwork Standards Grade: Custom .
- C. Type of Construction: Face frame.

- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
- F. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS.
 - 3. Edges: Grade HGS.
 - 4. Pattern Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
- G. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
 - 2. Drawer Sides and Backs: Thermally fused laminate panels with PVC or polyester edge banding.
 - 3. Drawer Bottoms: Hardwood plywood.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.
- I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Wood grains, matte finish.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: ANSI/BHMA A156.9, B01521.
- C. Wire Pulls: Back mounted, solid metal 4 inches long, 5/16 inch in diameter.

- D. Catches: Roller catches, ANSI/BHMA A156.9, B03071.
- E. Adjustable Shelf Standards and Supports: [ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- G. Drawer Slides: ANSI/BHMA A156.9.
 - 1. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 50 lb. load capacity.
- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
 - 1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
 - 1. For concealed hardware, provide manufacturer’s standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.4 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or

roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 072119

FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Closed-cell spray polyurethane foam.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of 1.5 lb/cu. ft. (24 kg/cu. m) and minimum aged R-value at 1-inch (25.4-mm) thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F (43 K x sq. m/W at 24 deg C). Maximum permeance rating of 0.1 perm @ 2.5" thickness (5.7 ng/Pa x s x sq. m).
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire- Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 3. Fire Resistance Rating: Meets ASTM E119 or UL 263 testing as part of an approved assembly.
- 2.2 MISCELLANEOUS MATERIALS
- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Cavity Walls: Install into cavities to thickness indicated on Drawings.

3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Sections:

1. Section 092900 “Gypsum Board” for sealing perimeter joints.
2. Section 093000 “Tiling” for sealing tile joints.
3. Section 095123 “Acoustical Panel Ceilings” for sealing edge moldings at perimeters with acoustical sealant.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
3. For materials failing tests, obtain joint-sealant manufacturer’s written instructions for corrective measures including use of specially formulated primers.

4. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. **Compatibility:** Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. **Liquid-Applied Joint Sealants:** Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. **Suitability for Immersion in Liquids.** Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. **Stain-Test-Response Characteristics:** Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. **Colors of Exposed Joint Sealants:** As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. **Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant:** ASTM C 920, Type S, Grade NS, Class 50, for Use NT.

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Non-sag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
- B. Immersible, Single-Component, Non-sag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses T and I.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining 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.

2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C, closed-cell material with a surface skin and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint-substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or

damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer’s written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

- a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces
 1. Joint Locations:
 - a. Vertical joints on exposed surfaces of walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows
 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50.
 3. Urethane Joint Sealant: Single component, nonsag, Class 50.

4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application (Type 2 Sealant): Interior joints in horizontal traffic surfaces.
- C. Joint-Sealant Application: Interior acoustical joints in vertical surfaces.
 1. Joint Location:
 - a. Acoustical joints from acoustical ceiling edge to wall board.

END OF SECTION

SECTION 081213

HOLLOW METAL DOOR FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal doors and frames.
- B. Related Requirements:
 - 1. Section 081416 “Flush Wood Doors” for wood doors installed in hollow-metal frames.
 - 2. Section 087100 “Door Hardware” for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.

4. Details of anchorages, joints, field splices, and connections.
 5. Details of moldings, removable stops, and glazing.
 6. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 1. Provide additional protection to prevent damage to factory-finished units.
 - B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
 - C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each unit to permit air circulation.
- 1.7 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Curries Company
 2. Amweld Building Products
 3. Pioneer Industries
 4. Steelcraft
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR HOLLOW METAL FRAMES

- A. Construct interior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- B. Hollow-Metal Frames: NAAMM-HMMA 860. At locations indicated in the Door and Frame Schedule.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Materials: Metallic-coated steel sheet, minimum thickness of 0.053-inch.
 - 3. Construction: Knocked down.
 - 4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042-inch thick.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. 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.
- G. Mineral-Fiber Insulation: ASTM C 665, 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 E 136 for combustion characteristics.
- H. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Provide countersunk, flat or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 2. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Four anchors per jamb from 60 to 90 inches high.
 3. Door Silencers: Drill stops to receive door silencers. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 4. Terminated Stops: On interior frames, terminate stops 6 inches above finish floor with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce frames to receive non-templated, mortised, and surface-mounted hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on secure side of interior frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.6 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 SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap frames to receive non-templated, mortised, and surface-mounted hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Install frames with removable stops located on secure side of opening.
 - b. Install door silencers in frames before grouting.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
2. Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16-inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16-inch, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 081416

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core flush wood doors with wood-veneer faces.
 - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Requirements:
 - 1. Section 081213 "Hollow Metal Door Frames".

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and handle of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during remainder of construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than ¼-inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01-inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS, GENERAL.

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
 - 1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea-formaldehyde.

2.2 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species: Select Maple.
 - 3. Cut: Plain Slice.
 - 4. Match between Veneer Leaves: Book match.
 - 5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 7. Exposed Vertical and Top Edges: Same species as faces or a compatible species - edge Type A.
 - 8. Core: Either glued wood stave or structural composite lumber.
 - 9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press. ?

2.3 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

2.4 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
1. Factory finish doors that are indicated to receive transparent finish.
 2. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- C. Transparent Finish:
1. Grade: Premium.
 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish.
 3. Staining: As selected by Architect from manufacturer's full range.
 4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware".
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
- C. Related Sections:
 - 1. Division 08 Section 081213 “Hollow Metal Frames”.
 - 2. Division 08 Section 081416 “Flush Wood Doors”.
- D. Contractor Responsibility:
 - 1. Construction Manager, Supplier and Installer shall coordinate all hardware with the requirements of the Owner.
- E. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC-2009 - International Building Code.
 - 3. NFPA 101-2015 - Life Safety Code.
 - 4. State Building Codes, Local Amendments.
- F. Standards: All hardware specified herein shall comply with the following industry standards:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including construction, installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after

completion of the installation test to include “as built” modifications made during installation, checkout, and acceptance.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Warranty: Special warranty specified in this Section.

1.5 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware schedule.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines & ICC/ANSI A117.1
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - 3. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- D. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1.8 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. **Named Manufacturers' Products:** Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. **References to BHMA Designations:** Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

- A. **Hinges:** BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 1. 1 ¾" Doors & Up to 3'-0" wide: Stanley FBB179-4 ½" (interior).
 2. 1 ¾" Doors & Up to 3'-0" wide: Hager BB1279-4 ½" (interior).
 3. 1 ¾" Doors over 3'-0" wide: Stanley FBB168-4 ½" (interior).
 4. 1 ¾" Doors over 3'-0" wide: Hager BB1168-4 ½" (interior).
 5. **Mechanical Locks and Latches:**
 - a. **Lock Functions:** As indicated in door hardware schedule.
 - b. **Mortise Locks:** BHMA A156.13; Security Grade, stamped steel case with steel or brass parts; Series 1000.
 - c. **Basis-of-Design Product:** Russwin-Corbin, large format, 7-pin removable core keyway to match existing building keying system.

2.3 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 1. **General:** Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. **Standards:** Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. **Cycle Testing:** Provide closers which have surpassed 10 million cycles in a test witnessed and verified by UL.
 4. **Size of Units:** Comply with manufacturer's written recommendations for sizing of door closers depending on size of door and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - b. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 - c. Closers shall not be installed on corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, where required.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC8000 Series.
 - b. LCN Closers (LC) - 4040XP Series.
 - c. Sargent Manufacturing (SA) - 351 Series.
 - d. Norton Door Controls (NO) - 7500 Series.

2.4 DOOR STOPS

- A. General: Door stops to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops. Do not mount floor stops where they will impede traffic.
 1. Acceptable Manufacturers:
 - a. Rockwood Manufacturing (RO).

2.5 MISCELLANEOUS HARDWARE

A. Push/Pull Hardware:

1. Push/Pull handles shall be BURNS #8426b Push plates shall be BURNS #54X4"X16".

B. Kick Plates:

1. 050 gauge solid stainless steel.

C. Silencers:

1. Ives 20 series for metal or equivalent.

2.6 ARCHITECTURAL SEALS

A. General: Gasket seals to be of type and design as specified below or in the Hardware Sets. Provide sound gasketing on interior doors where indicated.

B. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Acceptable Manufacturers:

1. Pemko Manufacturing (PE).

E. Fabrication:

1. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

2. Manufacturer's identification is permitted on rim of lock cylinders only.

F. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

G. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.7 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify Architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
- B. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating 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.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the Owner and Architect. They are a guideline only and should not be considered a detailed hardware, schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the Architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. See Drawings for Hardware Sets.

END OF SECTION

SECTION 092216

NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum soffits and grid systems.
 - 3. Deck suspended ceiling hanger.
- B. Related Requirements:
 - 1. Section 092900 “Gypsum Board”.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.

2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645.
1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch-(13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm).
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch-(1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
 2. Depth: 7/8 inch (22.2 mm).
- 2.3 AUXILIARY MATERIALS
- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 24 inches (610 mm) o.c. unless otherwise indicated.
 - 2. Multilayer Application: 24 inches (610 mm) o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior gypsum board.
- 2. Tile backing panels.

B. Related Requirements:

- 1. Section 093013 “Ceramic Tiling” for cementitious backer units installed as substrates for ceramic tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer’s written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 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.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.
 1. Thickness: 5/8 inch (15.9 mm).
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
 1. Core: 1/2 inch (12.7 mm), regular type.
 2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 4. Finish Coat: For third coat, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- 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.
- D. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- C. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- D. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-(6.4- to 9.5-mm-) wide joints to install sealant.
- E. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-(6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- F. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- G. Interior Insulated Wall Assemblies: Seal construction at perimeters and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- H. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Moisture- and Mold-Resistant Type: All locations unless otherwise noted.
- B. Single-Layer Application:
 - 1. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- C. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

- B. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- C. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 2: Panels that are substrate for tile
 - 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."

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from construction and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 093000

PORCELAIN FLOOR TILE – DEDUCT ALTERNATE NO. 1

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. Porcelain ceramic floor tile.
 - 2. Metal edge strips.

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 "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size, plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Joint sealants.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.6 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 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.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.7 PROJECT 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 PRODUCTS, GENERAL

- A. Porcelain Ceramic Tile is O.F.C.I. – Owner Furnished, Contractor Installed.
- 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 TCA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

- A. Tile Type PT-1: O.F.C.I. – Owner Furnished, Contractor Installed.
 - 1. Composition: Porcelain.
 - 2. Module Size: 12 by 12-inch, to match existing floor tile.
 - 3. Thickness: ¼-inch.
 - 4. Face: Plain and Pattern of design to match existing floor tiles, with cushion edges.
 - 5. Surface: Smooth, without abrasive admixture.

2.3 SETTING MATERIALS

- A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.
- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
- C. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8-inch.
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.

2.4 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: Owner Furnished, Contractor Installed.

2.5 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."
 - 1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
- D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

- E. **Chemical-Resistant Sealants:** For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout.

2.6 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 trim - Basis of Design:**
 - 1. Satin natural anodized extruded aluminum or stainless steel, style and dimensions to suit application.
 - 2. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), Alloy 6061-T6 for sheet and plate.
 - 3. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 - 4. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.
- C. **Temporary Protective Coating:** Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. **Tile Cleaner:** A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. **Grout Sealer:** Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

2.7 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 installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, and 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 adhesives, bonded mortar bed, or thin-set 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 adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. 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.
- C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with

continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA 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 TCA 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. Tile floors in wet areas or areas of heavy mopping.
 - b. 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 piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern to match existing floor tile layout 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 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, align joints unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Quarry Tile: 1/8 inch
- F. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- G. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

- H. 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.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- I. Marble 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 latex-Portland cement mortar (thinset).
 - 2. Do not extend waterproofing under thresholds set in latex-Portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing with elastomeric sealant.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CLEANING AND PROTECTING

- 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 tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-Portland cement 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 adjacent surfaces from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer.

3.5 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.
- D. 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.
- E. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- F. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.
- G. Before final inspection, clean all floor tile surfaces, new and existing floor tiles.

3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation CT-2 TCNA F113-15; Thinset Mortar on Concrete sub-floor.
 - a. Thinset Mortar: Latex-Portland cement mortar.
 - b. Grout: Water-cleanable epoxy grout.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 - 1. Ceramic Tile Installation CT-3 TCNA W243-15, ANSI A118.6 cement mortar bed.
 - a. Bond Coat for Cured-Bed Method: Latex-Portland cement mortar.
 - b. Grout: Water-cleanable epoxy grout.

END OF SECTION

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. Porcelain mosaic and large format wall tile.
2. Quarry tile.
3. Glazed wall tile.
4. Marble thresholds
5. Metal edge strips.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092900 "Gypsum Board" for tile backer units.

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, 137.1, 118.4, 118.6, 118.7 which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: For all tiles above - Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer has 5 years of proven experience with similar types of installations.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of each type of floor tile installation.
 - 2. Build mockup of each type of wall tile installation.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver 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.

1.8 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. Mix boxes during installation for best color blending.
- 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, except for sheet products, from manufacturer of setting and grouting materials.

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. Provide tile that complies with ANSI A137.1 for compositions and characteristics indicated. Provide tile as indication on the drawings in types, colors and patterns to the full extent of the design as shown.

A. Ceramic Tile Type CT: Non-slip unglazed ceramic floor tile. Basis of Design: Daltile.

1. Face Size: 2 inches by 2 inches with 2 inch by 2 inch accent tiles.
2. Face Size Variation: Rectified.
3. Thickness: 1/4 inch (6.4mm).
4. Face: Plain with cushion edges, pattern of design indicated on the Drawings.
5. Dynamic Coefficient of Friction: Not less than 0.42.
6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 - a. Floor Tile Field Color: “Light Smoke, Speckle”, #A04
 - b. Floor Tile Accent Color: “Light Smoke”, A43
7. Grout Color: As selected by Architect from manufacturer's full range
8. 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, same as adjoining floor tile.
 - b. External Corners for Thin-set Mortar Installations: Surface bullnose, module size same as adjoining floor tile.
 - c. Internal Corners: Cove, module size, same as adjoining floor tile.

B. Ceramic Tile Type WT: Glazed Wall Tile

1. Module Size: 4-1/4 by 4 1/4 inches (108 by 108 mm) with 4 1/4 inches x 4 1/4 inches accent tile.
2. Face Size Variation: Rectified.
3. Thickness: 5/16 inch (8 mm).
4. Face: Plain with cushioned edges and half round, respectively.

5. Finish: glaze – glazed finish.
 6. Tile Color and Pattern: Color to be selected by Architect and Owner from manufacturer's standard colors submitted. Pattern to be as shown on the Drawings.
 - a. Wall Tile Field Color "A": "Biscuit".
 - b. Wall Tile Accent Color "B": "Galaxy".
 - c. Wall Tile Accent Tile "C": "Spa".
 7. Grout Color: As selected from samples submitted. Provide full range of standard colors.
 8. 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. External and internal corners for Installations: Provide full rounded outside corners, using manufacturer's bullnose in-corner and out-corner.
 9. Grout Color: As selected by Architect from manufacturer's full range of grout colors from samples submitted.
- C. Ceramic Tile Type CT: Glazed wall tile.
1. Module Size: 4-1/4 by 4-1/4 inches (108 by 108 mm) with 4 1/4" x 4 1/4" accent tiles.
 2. Face Size Variation: Rectified.
 3. Thickness: 5/16 inch (8 mm).
 4. Face: Plain with cushion edges. Pattern of design indicated on the Drawings.
 5. Finish: Bright, clear.
 6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 7. Grout Color: As selected by Architect from manufacturer's full range.
 8. 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. External Corners for Thin-set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - b. 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 (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.
 - a. ADA compliant Double Hollywood style thresholds.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Thickness: 1/2 inch (12.7 mm).

2.5 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.
- B. Latex Portland Cement Mortar for thick beds, screeds, leveling beds and scratch/plaster coats to be weather, frost, shock resistant, GreenGuard compliant, and meet the following physical requirements:
 - 1. Compressive Strength (ANSI A118.4 Modified): >4,000 psi (27.6 MPa)
 - 2. Water Absorption (ANSI A118.6): ≤ 5%
 - 3. Service Rating (TCA/ASTM C627
 - 4. E84 Modified): 0
 - 5. Total VOC Content: < 0.05 mg/m³
- C. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7.
- B. Latex Portland Cement Grout to be shock resistant, GreenGuard compliant, as well as meet the following physical requirements:

1. Compressive Strength (ANSI A118.7): 4,500 psi (31 MPa)
2. Tensile Strength (ANSI A118.7): 500 psi (3.4 MPa)
3. Flexural Strength (ANSI A118.7): 1,250 psi (8.6 MPa)
4. Water Absorption (ANSI A118.7): < 5%
5. Linear Shrinkage (ANSI A118.7): < 0.05 %
6. Smoke & Flame Contribution (ASTM.E84 Modified): 0
7. Total VOC Content: < 0.05 mg/m³

2.7 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 trim - Basis of Design:
 1. Satin natural anodized extruded aluminum or stainless steel, style and dimensions to suit application.
 2. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), Alloy 6061-T6 for sheet and plate.
 3. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 2. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.
- C. Product - Schluter Systems; www.schluter.com
 1. Rondo edge strips to cap wall tile at wainscot; inside corners and outside corners respectively.
 2. Reno- Install at open edges of floor and outside corners of wall tile.
 3. Dilex-BT wall tile - expansion joint units as required
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout- install on all tile prior to final walkthrough.

2.8 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 mortars of all kinds comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - 3. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - 4. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 5. 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.
 - 6. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
 - 7. 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 method with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

- B. 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 CERAMIC TILE INSTALLATION

- 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.
- B. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - 1. Tile floors in wet areas or areas of heavy mopping.
 - 2. Tile floors consisting of rib-backed tiles.
- C. 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.
- D. 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.
- E. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- F. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- G. 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.
- H. 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.
- I. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
- J. 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.
- K. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Mosaic Tile: 1/8 inch
 2. Quarry Tile: 1/8 inch
 3. Glazed Wall Tile: 1/16 inch
 4. Porcelain Wall Tile: 1/16 inch
- L. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- M. 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.
- N. Marble 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 latex-Portland cement mortar (thinset).
 2. Do not extend waterproofing under thresholds set in latex-Portland cement mortar. Fill joints between such thresholds and adjoining tile set on waterproofing with elastomeric sealant.
- O. Metal Edge Strips: Install at locations where exposed edge of tile is at a corner or a cap, including outside corners at wall tile and top of wainscot at wall tile. Provide metal edge strip at Quarry tile where it meets any other finish.
- P. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors and wall tiles according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- 3.4 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.
- C. Remove grout residue from tile as soon as possible.
1. 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.

3.5 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.

3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation CT-2 TCNA F113-15; Thinset Mortar on Concrete sub-floor.
 - 2. Thinset Mortar: Latex-Portland cement mortar.
 - 3. Grout: High-performance sanded grout.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 - 1. Ceramic Tile Installation CT-3 TCNA W243-15, ANSI A118.6 cement mortar bed.
 - 2. Bond Coat for Cured-Bed Method: Latex-Portland cement mortar.
 - 3. Grout: High-performance unsanded grout.

END OF SECTION

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 acoustical panels ceilings, metal ceilings and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch-(150-mm-) square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-(150-mm)-long Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages 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 stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- 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: Comply with ASTM E 1264 for Class A materials.
 2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL TILES, GENERAL

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Armstrong World Industries, Inc.
 2. CertainTeed Corp.
 3. Chicago Metallic Corporation.
 4. USG Interiors, Inc.; Subsidiary of USG Corporation.

- B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.
- C. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- D. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS: ACT-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Cortega 770.
 - 2. Color: as selected from manufacturer's full range.
 - 3. Edge/Joint Detail: Square edge.
 - 4. Modular Size: 24 by 24 inches.

2.4 ACOUSTICAL PANELS: ACT-2

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong Ceramaguard 607.
 - 2. Color: as selected from manufacturer's full range.
 - 3. Edge/Joint Detail: Square edge.
 - 4. Modular Size: 24 by 24 inches.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content, plus one-half of preconsumer recycled content not less than 75 percent.

- B. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
 - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. 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.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 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. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 4. Size: Select wire diameter so 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 provide not less than 0.106-inch diameter wire.
- E. Angle Hangers: Angles with legs not less than 7/8-inch wide; formed with 0.04-inch thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch diameter bolts.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

2.7 MISCELLANEOUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
- B. Staples: 5/16-inch long, divergent-point staples.

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. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. 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, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- 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 either to structures 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 framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 7. 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.
 8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
1. Arrange directionally patterned acoustical tiles as follows:
 - a. As indicated on reflected ceiling plans.
 - b. Install tiles with pattern running in one direction parallel to long axis of space.
 - c. Install tiles in a basket-weave pattern.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
- F. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.
3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- 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. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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. Resilient base.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

- 1. Coordinate mockups in this Section with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive resilient products during the following time periods:

- 1. 48 hours before installation.
- 2. During installation.
- 3. 48 hours after installation.

- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE: RB-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Roppe.
 - 2. Johnsonite.
 - 3. Armstrong.
- 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 (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.

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. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 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. Steel.
 - 2. Gypsum board.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

3. VOC content.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore.

2. Sherwin Williams.

3. Glidden.

B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- C. VOC Content: Products shall comply with VOC limits of the State of New Hampshire.
- D. Colors: As selected by Architect from manufacturer’s full range.

2.3 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: MPI #50.

2.4 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive, for Metal: MPI #79.
- B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

2.5 WATER-BASED PAINTS

- A. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #145.
- B. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5): MPI #141.

2.6 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.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove 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. Gypsum Board: 12 percent.

- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in “MPI Manual” applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 2, “Hand Tool Cleaning.”
 - 2. SSPC-SP 3, “Power Tool Cleaning.”
 - 3. SSPC-SP 7/NACE No. 4, “Brush-off Blast Cleaning.”
 - 4. SSPC-SP 11, “Power Tool Cleaning to Bare Metal.”
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in “MPI Manual.”
 - 1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Latex over Alkyd Primer System:

- a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79 or primer, alkyd, quick dry, for metal, MPI #76.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

B. Gypsum Board Substrates:

1. Institutional Low-Odor/VOC Latex System:

- a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, (Gloss Level 3), MPI #145.

END OF SECTION

SECTION 101423

PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Room-identification signs.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least.
- C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Room-Identification Signs: Full-size Sample.
- D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

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 agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
- 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for signs.

2.2 SIGNS

- A. Follow Standard Room Sign requirements and configurations. See Door Schedule for sign locations. Refer to drawings Standards for Sign Type Designations.
- B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated to phenolic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.125 inch (3.18 mm).
 - b. Color(s): As selected by Architect from manufacturer's full range.
 - 2. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: Square cut.
 - b. Corner Condition in Elevation: Square.
 - 3. Mounting: Surface mounted to wall with two-face tape.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.

2.4 FABRICATION

- A. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- B. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.
- C. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
- D. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
 - 1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Room-Identification Signs: Install in locations on walls as indicated.
- C. Mounting Methods:
 - 1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 102113

PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for blocking.
- 2. Section 102800 "Toilet and Bath Accessories".

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
- 2. Show locations of cutouts for compartment-mounted toilet accessories.
- 3. Show locations of centerlines of toilet fixtures.
- 4. Show locations of floor drains.
- 5. Show overhead support or bracing locations.

C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of toilet compartment material indicated.

- 1. Include Samples of hardware and accessories involving material and color selection.

- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-(152-mm-) square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.
- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" 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. Scranton Hiny Hiders
 - 2. General Partitions
 - 3. Bobrick Co
 - 4. Hadrian Manufacturing

5. Bradley Corporation
 6. Global Partitions
 - B. Toilet-Enclosure Style: Floor anchored and overhead braced.
 - C. Urinal-Screen Style: Floor anchored and overhead braced.
 - D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 1. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 2. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
 - E. Pilaster Shoes: Manufacturer's standard design; stainless steel.
 - F. Urinal-Screen Post: Manufacturer's standard post design of 1-3/4-inch-square aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster
 - G. Brackets (Fittings):
 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- 2.3 HARDWARE AND ACCESSORIES
- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
 1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard continuous, spring-loaded type.
 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper.

6. Door Pull: Manufacturer's standard unit that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

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 or chrome-plated steel or brass, 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.

2.4 FABRICATION

A. 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. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-(610-mm-) wide, in-swinging doors for standard toilet compartments and minimum 34-inch-(914-mm-) wide, in-swinging doors with a minimum 32-inch-(813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch (13 mm).

b. Panels and Walls: 1 inch (25 mm).

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors

with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 102800

TOILET AND BATH 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. Bathroom accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to be included in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 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.

1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, 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), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) 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.

J. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. Bradley Corporation
2. Bobrick Toilet Accessories
3. ASI Group

2.2 WASHROOM ACCESSORIES

A. Grab Bar: (Accessory A):

1. Basis-of-Design Product: Bobrick Series B-6806.99 x 18 vertical, x 36 horizontal, x 42 horizontal.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: As indicated on Drawings.

B. Foam Soap Dispenser: (Accessory B):

1. Description: Designed for dispensing soap in foam form.
2. Mounting: Wall surface mounted.
3. Capacity: 40-fl oz.
4. Lockset: Tumbler type.
5. Refill Indicator: Window type.

C. Paper Towel (Folded) Dispenser: (Accessory C):

1. Basis-of-Design Product: Bobrick B-262.

D. Sanitary-Napkin Disposal Unit: (Accessory D):

1. Basis-of-Design Product: Bobrick B-270.
2. Mounting: Partition surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.

- E. Toilet Tissue (Roll) Dispenser: (Accessory E):
 - 1. Basis-of-Design Product: Bobrick B-686.
 - 2. Mounting: Wall and Partition surface mounted.
- F. Mirror Unit: (Accessory F):
 - 1. Basis-of-Design Product: Bobrick B-292 – 1836.
 - 2. Integral Shelf: 5 inches (127 mm) deep.
- G. Coat Hook (Accessory G):
 - 1. Basis-of-Design Product: Bobrick B-670.

2.3 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 (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 123661

SOLID SURFACING COUNTERTOPS & INTERIOR WINDOW SILLS

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. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.
 - 4. Solid Surface Interior Window Sills.

- B. Related Requirements:
 - 1. "Plumbing Fixtures".

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Samples for Initial Selection: For each type of material exposed to view.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.6 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Basis of Design: Products as manufactured by Wilsonart or equal.
 - 2. Type: Provide Standard type, as indicated.
 - 3. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards".
 - 1. Grade: Custom.
- B. Countertops: 3/4-inch thick, solid surface material with front edge built up with same material.
- C. Backsplashes: 3/4-inch thick, solid surface material.
- D. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- E. Joints: Fabricate countertops without joints.
- F. Cutouts and Holes:
 - 1. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- D. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- E. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants".

END OF SECTION

SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide labor, materials, accessories, and other related items as required to complete operations in connection with the complete installation of the plumbing systems as indicated on the Drawings and as specified herein.

1.2 RELATED REQUIREMENTS

- A. Conditions of the Contract apply to the work, including the work of this Division. Examine Contract Documents for requirements affecting the work.

1.3 PRE-CONSTRUCTION MEETING

- A. Conduct a plumbing conference at Project site to comply with requirements of Division 01 Section "Project Management and Coordination" and the following:
 - 1. At least 14 days prior to beginning of plumbing work, conduct a meeting to review detailed requirements for mechanical systems installation and testing requirements. Review plumbing Drawings and Specifications, discuss project specific details and requirements, and review and discuss expectations for quality control. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with plumbing systems installation to attend conference, including, but not limited to, the following:
 - a. General Contractor's superintendent.
 - b. Plumbing Subcontractor's project managers.
 - c. Plumbing Subcontractor's job foreman.
 - d. Mechanical Subcontractors' project managers.
 - e. Mechanical Subcontractors' job foremen.
 - f. Sheetmetal job foreman.
 - g. Controls job foreman.
 - h. Job clerk.
 - i. Architect's construction administrator.

1.4 DRAWINGS

- A. The general location of the apparatus and the details of the work are indicated on the Drawings. Exact locations not indicated shall be determined at the site as the work progresses and shall be subject to the Architect's approval.
- B. It is not intended that the Drawings shall show every pipe, pipe rise, pipe drop, pipe fitting, or appliance, but it shall be a requirement to furnish, without additional expense, material and labor necessary to complete the systems in accordance with the design intent and with the highest possible quality available.

1.5 ALTERATIONS

- A. Execute alterations, additions, removals, relocations, new work, and other related items as indicated or required to provide a complete installation in accordance with the intent of the Contract Documents, including changes required by building alterations.
- B. Existing work disturbed or damaged by the alterations or the new work shall be repaired or replaced to the Architect's satisfaction and at no additional cost to the Owner.
- C. Existing piping and other systems indicated to be removed, shall be removed from the site. Cap off existing services remaining. The Owner retains the right to ownership of plumbing equipment scheduled to be removed; store such equipment where requested by the Owner. Material not retained by the Owner shall be removed from the site.

1.6 CONTINUITY OF SERVICE

- A. Arrange to execute the work at such times and in such locations as may be required to provide uninterrupted service for the building or any of its locations. Any unavoidable conditions requiring reduced building capacity shall be arranged for by programming with the Owner's duly authorized representative at the building subject to the Architect's approval. If necessary, temporary work shall be installed to provide for the condition. Authorization for interrupting service shall be obtained in writing from the Owner. Any interruption of normal service shall be performed during an overtime period to be scheduled with the Owner. Costs for overtime work shall be included in the bid.

1.7 REQUIREMENTS

- A. Installation Instructions: Obtain manufacturer's printed installation instructions to aid in properly executing work on major pieces of equipment. Install equipment in accordance with manufacturer's recommendations.
- B. Objectionable Noise, Fumes and Vibration:
 - 1. Plumbing and electrical equipment shall operate without creating objectionable noise, fumes, or vibration, as determined by the Architect.
 - 2. If such objectionable noise, fumes, or vibration is produced and transmitted to occupied portions of building by apparatus, piping, or any other part of

mechanical and electrical work, make necessary changes and additions, as approved, without extra cost to Owner.

C. Equipment Design and Installation:

1. Uniformity: Unless otherwise specified, equipment or material of same type or classification, used for same purposes, shall be product of same manufacturer.
2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog number shall be designed in conformity with ASME, IEEE, or other applicable technical standards, suitable for maximum working pressure, and with neat and finished appearance.
3. Installation: Erect equipment aligned, level and adjusted for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily, and so that parts are easily accessible for inspection, operation, maintenance and repair. Minor deviations from indicated arrangements may be made, as approved.

D. Hanging of Equipment and Piping:

1. Support equipment and piping from the top chord of bar joists at the "Panel Points" or from the top flange of beams. Piping 2-inch (50 mm) nominal and smaller may be supported from the bottom chord of the bar joists at the "Panel Points" or from the bottom flange of the beams.

E. Protection of Equipment and Materials: Responsibility for care and protection of materials and mechanical work rests with the Contractor until the entire project has been completed, tested and the project is accepted by the Owner.

F. Foundations:

1. Ceiling Mounting: Where ceiling mounting is indicated or specified, use suspended platform or strap hangers, bracket or shelf, whichever is most suitable for equipment and its location. Construct of structural steel members, steel plates, or rods, as required; brace and fasten to building structure or to inserts as approved, or as detailed.
2. Where floor mounting is indicated, locate equipment on 4 inch (102 mm) high reinforced concrete pad of adequate size with anchors and base plates as required, on pressure-treated sleepers, or on structural steel frame as detailed. The corners of pads shall be chamfered 1 inch (25 mm). Pad and steel sizes and location shall be coordinated with the approved equipment.

1.8 ACCESS PANELS

- A. Access panels required for items furnished under Division 22 shall be provided under this Division.

- B. Manufacturer, and Model of standard doors: J. L. Industries, Inc., Model WB; Karp Associates, Inc., Model KDW; or The Williams Brothers Corporation of America, Model WB-DW.
- C. Access panels shall be standard panels, 12 inch x 16 inch (305 mm x 406 mm) minimum unless indicated otherwise. Panels installed in areas of high moisture concentration, such as toilet rooms, near plumbing fixtures, food preparation areas, or outdoors, shall be fabricated of paintable stainless steel or aluminum for corrosion resistance.
- D. Doors and frames shall be factory primed. Latches shall be operated by tumbler lock, keyed alike, furnish 3 keys to the Owner.
- E. Access panels in fire-rated construction shall have the same UL rating as the building assembly in which they are installed.
- F. Provide access panels in building construction where required for access to components such as valves, air vents, drains, actuators, and other related items.

1.9 ELECTRIC WORK

- A. Provide motors, pilot lights, controllers, limit switches, and other related items for equipment provided under Division 22.
- B. Except as noted, required line switches, fused switches, and other related items and necessary wiring to properly connect equipment to motors and switches shall be furnished and installed under Division 26, Electric.
- C. Provide complete wiring system for automatic controls as specified under Section Division 23 Section "Instrumentation and Controls for Mechanical Systems."
- D. Wiring shall conform to the requirements of the National Electrical Code.

1.10 FIRESTOPPING

- A. Firestopping for penetrations of piping and equipment through fire rated and smoke rated building assemblies, including but not limited to partitions, walls, floors, ceilings, and roofs, shall be furnished and installed under this Section.
- B. Selection of firestopping materials and installation of firestopping materials shall be in accordance with Division 07 Section "Through Penetration Firestop Systems." Coordinate with other trades for a consistent installation.
- C. Refer to Architectural Drawings for locations of fire rated building assemblies.

1.11 SUBMITTALS

- A. After award of Contract and before installation, submit for approval Shop Drawings, bulletins, Product Data, Samples, and other related items.

- B. Submit Shop Drawings and Product Data as required in each Section. Submittal shall include physical data and performance data required to verify compliance with the Contract Documents.
- C. Submit Samples as required in each Section, and as indicated on the Drawings. These will generally be retained by the Architect/Engineer, unless otherwise indicated. Contractor may request these items returned; provide return shipping for returns.
- D. Submit Mock-Ups as required in each Section, and as indicated on the Drawings. For general mock-up procedures, refer to Division 01 Section "Quality Requirements." Deliver to the Architect/Engineer for review if so indicated. Provide return shipping.
- E. Architect/Engineer's review will not include the review, coordination, or verification of dimensions or quantities; these shall be the responsibility of the Contractor.

1.12 SUBSTITUTIONS

- A. Comply with provisions of the Instructions to Bidders and General Conditions (or General Requirements).
- B. Materials shall be as specified herein, except, consideration shall be given to other products that meet or exceed those specified if requested five (5) business days prior to the date of bid opening in accordance with SECTION 01600 – PRODUCT REQUIREMENTS.
- C. The first item listed under "Acceptable Manufacturers", "Approved Manufacturers" or "Manufacturers" is the design basis.
 - 1. Other manufacturers listed may be used in the base bid, but conformance with details of the Specifications, as well as dimensional and electrical data, shall be verified by the Contractor.
 - 2. Architect/Engineer has not verified that each listed manufacturer has the ability to provide an acceptable substitution for the basis-of-design product. Contractor may not assume that substitutions will be approved.
 - 3. Modifications required as a result of differences between the design basis item and the submitted and approved item must be approved by the Architect and made at the Contractor's expense. As an example, if a rooftop HVAC unit is submitted and approved and if the unit's dimensions and weight are different from those of the unit which was used as the design basis, the Contractor shall be responsible for building structural modifications required to accommodate the submitted and approved unit, at no additional cost to the Owner.
 - 4. When, in the Architect or Engineer's opinion, architectural or engineering services are necessary for the coordination of substituted items, the Contractor shall reimburse the Owner for the cost of these services.
 - 5. For items which have no manufacturers listed, any item conforming with the Contract Documents is acceptable.

- D. Substitutions from manufacturers or providers which are not listed may be proposed within the time allowed in the General Conditions of the Specifications.
 - 1. The exception to this is products for which the list of manufacturers or providers is limited by the wording "no substitutions" or similar wording.

1.13 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction
- B. Coordinate space requirements and installation of plumbing and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- C. In finished areas, conceal pipes and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- D. Coordinate completion and clean-up of work of separate Sections in preparation for Substantial Completion.
- E. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.14 REQUESTS FOR ARCHITECT'S CADD DRAWINGS

- A. In lieu of generating their own CADD drawings, the Contractor may elect to use the Architect's electronic copies of CADD drawings for the purpose of developing coordination drawings, developing control system graphics or for other reasons that pertain to the requirements of this Contract. If the Contractor elects to utilize the Architect's electronic copies of CADD drawings, the electronic files shall be purchased from the Architect at the Architect's current billing rate per drawing. The Contractor shall provide payment and shall sign a release-of-liability form before electronic CADD drawings are released.

1.15 CLEANING

- A. Remove debris from site daily.
- B. Material and pieces of equipment shall be turned over to the Owner free of dust and dirt, both inside and out.
- C. At the completion of the Project, equipment shall have a clean, neat appearance of factory finish by cleaning or repainting as required.
- D. At the completion of the Project, surfaces exposed to view shall have a clean, neat appearance of finish free from smudges and scratches by cleaning or repainting as required.

1.16 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer 7 days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of responsible manufacturer's representative in accordance with manufacturer's instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.17 ADJUSTMENTS AND OWNER'S INSTRUCTIONS

- A. After completion of the installation work called for in the Contract Documents, furnish necessary mechanics or engineers for the adjustment and operation of the systems, to the end that the systems are perfectly adjusted and turned over to the Owner in perfect working order. Further instruct the Owner's authorized representative in the care and operation of the installation, providing framed instruction charts, directions, and other related items.
- B. Instructors providing Owner training shall be experienced and familiar with jobsite.

1.18 TESTING

- A. Perform other tests specified in individual Sections of this Specification.

1.19 COMPLETION OF SYSTEMS

- A. The following plumbing systems shall not be complete until the following conditions are satisfied:
 - 1. Piping Systems:
 - a. Piping, valves and accessories shall be completely installed, insulated and labeled as specified.

- b. Piping pressure testing be completed and pressure testing reports shall be submitted and approved.
- c. Piping systems shall be balanced and a balancing report shall be submitted and approved.

1.20 OPERATING AND MAINTENANCE MANUALS

- A. Furnish 2 bound operating and maintenance manuals and forward to the Architect for review and transmittal to the Owner.
- B. For maintenance purposes, provide approved Submittals, parts lists, specifications, and manufacturer's maintenance bulletins for each piece of equipment. For materials used which have been submitted to the Architect for approval but do not require regular maintenance, such as piping and insulation, provide one copy of approved Submittals.
- C. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment or material so that service or spare parts can be readily obtained.

1.21 WARRANTY

- A. Provide guarantees and warranties for work under this Contract as indicated in the general requirements of the Contract.
- B. Provide manufacturers' standard warranties and guarantees for work by the plumbing trades. However, such warranties and guarantees shall be in addition to and not in lieu of other liabilities which the manufacturer and the Mechanical Contractor may have by law or by other provisions of the Contract Documents.
- C. Guarantee that elements of the systems provided under this Contract are of sufficient capacity to meet the specified performance requirements as set forth in these Specifications or as indicated on the Drawings.
- D. Upon receipt of notice from the Owner of failure of any part of the plumbing systems or equipment during the warranty period, the Plumbing Subcontractor shall replace the affected part or parts.
- E. Furnish a written guarantee covering the above requirements before submitting the application for final payment..

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 220500

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A53/A53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
 - 4. Metraflex Company (The).
 - 5. Proco Products, Inc.

- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls. Sleeves are not required for core-drilled holes in concrete foundation walls.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of piping chases, mechanical equipment areas, and other wet areas 2 inches (50 mm) above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 1. Exterior Concrete Walls above Grade: Cast-iron wall sleeves.
 2. Exterior Concrete Walls below Grade: Cast-iron wall sleeves with sleeve-seal system. Select sleeve size to allow for 1 inch (25 mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 3. Concrete Slabs on Grade: Cast-iron sleeves with sleeve-seal system. Select sleeve size to allow for 1 inch (25 mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 4. Concrete Slabs above Grade: Galvanized-steel-pipe sleeves.
 5. Interior Partitions: Galvanized-steel-pipe sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.
- D. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish and concealed hinge
- F. Stainless Steel: May be substituted for other materials.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for Piping:
 - a. Piping at Plumbing Fixtures and Equipment and Other Potentially Damp Locations: Brass or stainless steel only; steel is not allowed.
 - b. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - c. Insulated Piping: Steel or brass.
 - d. Bare Piping at Floor Penetrations in Finished Spaces: Brass.
 - e. Bare Piping at Wall Penetrations in Finished Spaces: Brass or steel.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Brass or steel.
 - g. Bare Piping in Unfinished Service Spaces: Brass.
 - h. Bare Piping in Equipment Rooms: Brass with rough-brass finish.
- C. Install floor plates for piping penetrations of equipment-room and piping chase floors.
 - 1. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - a. New Piping: One-piece, floor-plate type.
 - b. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.
- B. Existing Piping: Verify that each penetration in renovated areas, and areas where existing piping is modified or insulated, is provided with an escutcheon.

END OF SECTION 220518

SECTION 220553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Warning signs and labels.
 - 2. Pipe labels.
 - 3. Valve tags.
 - 4. Warning tags.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.
- F. Owner's identification system standards.

1.3 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch (1.6 mm) thick, and having predrilled holes for attachment hardware.

- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4-inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2-inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.
 - 1. Tag Material: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.

- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.4 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches (75 by 133 mm) minimum.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 VERIFICATION

- A. Verify and submit Owner's standards for identification systems, and suggest modifications to this Specification to comply with these standards.

3.2 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1-2015, on each piping system.
 - 1. Identification Paint: Use for contrasting background:
 - 2. Stencil Paint: Use for pipe marking.

- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
1. Domestic Water Piping:
 - a. Background Color: Blue.
 - b. Letter Color: White.
 2. Sanitary Waste and Storm Drainage Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
 - a. Cold and Hot Water: 1-1/2 inches (38 mm), round.

2. Letter Color:
 - a. Cold and Hot Water: Black.
 - b. Non-Potable Water: Black.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe positioning systems.

1.2 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
1. Trapeze pipe hangers.
 2. Metal framing systems.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated or copper-colored epoxy-finished-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.
3. Copper-plated hangers and clamps are plated for identification only. Traditional thin copper plating on steel substrate does not provide adequate protection from galvanic corrosion due to contact between dissimilar metals. Copper color of plating or paint is primarily for identification of hangers sized for copper tubing.
 - a. Where copper-plated supports are used with copper piping, provide additional protection between dissimilar metals, such as thick plastic or vinyl factory coating, felt liner, or plastic-lined cushion clamps.
 - b. Epoxy Coatings: A copper-colored heavy-duty epoxy finish such as Cooper B-Line's Dura-Copper or Tolco Copper-Tec is acceptable protection between dissimilar metals in normally dry locations. In potentially damp or wet locations and locations exposed to weather, provide additional protection between dissimilar metals, such as thick plastic or vinyl factory coating, or plastic-lined cushion clamps.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carpenter & Paterson, Inc.
 - 2. ERICO International Corporation.
 - 3. National Pipe Hanger Corporation.
 - 4. PHS Industries, Inc.
 - 5. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 - 6. Piping Technology & Products, Inc.
 - 7. Rilco Manufacturing Co., Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.
- C. Insulation-Insert Material for Hot Piping: ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Pull-out, Tension, and Shear Capacities: Appropriate for supported loads and building materials where used.
- B. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete.
- C. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened Portland cement concrete.
- D. Anchors in Wood Framing: Fully-threaded screw anchors for wood, case-hardened zinc plated steel, specifically designed for vertical or horizontal applications, with integral threaded-rod couplings where applicable.

2.5 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.6 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches (100 mm) thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
 - 3. Install wood framing anchors, pre-drilling the wood at the size listed in the anchor manufacturer's literature to prevent damage to the wood.
- E. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- M. Insulated Piping:
 - 1. Attach clamps and spacers to piping:
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

- b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1 inch (25 mm).

3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 Painting Sections

- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.5 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel supports and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing. Copper plating or copper-colored paint is for identification purposes only; provide additional protection from dissimilar metals.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1,050 deg F (566 deg C), pipes NPS 4 to NPS 24 (DN 100 to DN 600), requiring up to 4 inches (100 mm) of insulation.
 3. Carbon or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
 6. Adjustable, Swivel Split or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).

7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36 (DN 100 to DN 900), with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 (DN 65 to DN 900) if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- O. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Warning signs and labels.
 - 2. Pipe labels.
 - 3. Valve tags.
 - 4. Warning tags.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.
- F. Owner's identification system standards.

1.3 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch (1.6 mm) thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.

- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4-inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2-inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.
 - 1. Tag Material: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.

- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.4 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches (75 by 133 mm) minimum.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 VERIFICATION

- A. Verify and submit Owner's standards for identification systems, and suggest modifications to this Specification to comply with these standards.

3.2 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles, complying with ASME A13.1-2015, on each piping system.
 - 1. Identification Paint: Use for contrasting background.
 - 2. Stencil Paint: Use for pipe marking.

- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
1. Domestic Water Piping:
 - a. Background Color: Blue.
 - b. Letter Color: White.
 2. Sanitary Waste and Storm Drainage Piping:
 - a. Background Color: White.
 - b. Letter Color: Black.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
 - a. Cold and Hot Water: 1-1/2 inches (38 mm), round.

2. Letter Color:
 - a. Cold and Hot Water: Black.
 - b. Non-Potable Water: Black.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water and hot-water piping.
2. Domestic recirculating hot-water piping.
3. Supplies and drains for handicap-accessible lavatories and sinks.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail insulation application at pipe expansion joints for each type of insulation.
3. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
4. Detail removable insulation at piping specialties, equipment connections, pump bodies, and access panels.
5. Detail application of field-applied jackets.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 1. Supply and Drain Protective Shielding Guards: ICC A117.1.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.
- 1.6 COORDINATION
 - A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - B. Coordinate clearance requirements with piping Installer for piping insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- 1.7 SCHEDULING
 - A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
 1. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," and "Equipment Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

- F. Flexible Elastomeric Insulation: Closed-cell, sponge or expanded-rubber materials. Sheet and tubular form as applicable. Comply with ASTM C534, Type I for tubular materials.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armacell LLC; AP Armaflex or AP Armaflex FS as thickness requires.
 - b. K-Flex USA; Insul-Lock, Insul-Tube, and Insul-Sheet.
 - c. No substitutions.
- G. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Micro-Lok.
 - b. Knauf Insulation; 1,000-Degree Pipe Insulation.
 - c. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

- A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C449.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ramco Insulation, Inc.; Super-Stik.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Product attributes in first paragraph below are based on Foster Brand products; there are variations among manufacturers.
- C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armacell LLC; Armaflex 520 Adhesive.

- b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
 - c. K-Flex USA; R-373 Contact Adhesive.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Mon-Eco Industries, Inc.; 22-25.
- E. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Mon-Eco Industries, Inc.; 22-25.
- F. PVC Jacket Adhesive: Compatible with PVC jacket.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E96/E96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180° F (Minus 29 to plus 82° C).
 4. Solids Content: ASTM D1644, 58 percent by volume and 70 percent by weight.
 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
 - b. Eagle Bridges - Marathon Industries; 501.
 - c. Mon-Eco Industries, Inc.; 55-10.
 2. Water-Vapor Permeance: ASTM F1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
 3. Service Temperature Range: 0 to 180° F (Minus 18 to plus 82° C).
 4. Solids Content: ASTM D1644, 44 percent by volume and 62 percent by weight.
 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. Eagle Bridges - Marathon Industries; 570.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 2. Water-Vapor Permeance: ASTM F1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).
 4. Solids Content: ASTM D1644, 33 percent by volume and 46 percent by weight.

5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.
 - b. Eagle Bridges - Marathon Industries; 550.
 - c. Mon-Eco Industries, Inc.; 55-50.
 - d. Vimasco Corporation; WC-1/WC-5.
 2. Water-Vapor Permeance: ASTM F1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180° F (Minus 29 to plus 82° C).
 4. Solids Content: 60 percent by volume and 66 percent by weight.
 5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
 - c. Vimasco Corporation; 713 and 714.
 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 3. Service Temperature Range: 0 to plus 180° F (Minus 18 to plus 82° C).
 4. Color: White.

2.6 SEALANTS

A. ASJ Flashing Sealants, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250° F (Minus 40 to plus 121° C).
5. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Zeston.
 - b. Proto Corporation; LoSmoke.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45 and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Nashua.
 - e. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 2. Width: 3 inches (75 mm).
 3. Thickness: 11.5 mils (0.29 mm).
 4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf per inch (7.2 N/mm) in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. Compac Corporation; 130.
 - c. Venture Tape; 1506 CW NS.
 2. Width: 2 inches (50 mm).
 3. Thickness: 6 mils (0.15 mm).

4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf per inch (3.3 N/mm) in width.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
2. Stainless Steel: ASTM A167 or ASTM A240/A240M, Type 304; 0.015-inch (0.38 mm) thick, 1/2inch (13 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020-inch (0.51 mm) thick, 1/2inch (13 mm) wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.

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. C & F Wire.

2.11 PROTECTIVE SHIELDING GUARDS

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

1. Engineered Brass Company.
2. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.
3. McGuire Manufacturing.
4. Plumberex.
5. Truebro; a brand of IPS Corporation.
6. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

B. Protective Shielding Pipe Covers:

1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

C. Protective Lavatory Shields:

1. Description: Manufactured total enclosure for covering underside of lavatories and their hot-and-cold-water supplies and trap and drain piping. One-piece construction of rigid high-impact stain-resistant paintable white PVC with a fine haircell finish, 0.093-inch (2.3 mm) thickness. UL Listed per ADA article 4.19.4.22FF. Stainless steel reusable screw fasteners for mounting to wall. Comply with Americans with Disabilities Act (ADA) requirements. Provide factory pre-cut to closely fit the underside of the installed model of lavatory.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.

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

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with heat tracing manufacturer's requirements regarding insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.

- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE AND EQUIPMENT INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe

- insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness

over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 1. Install preformed valve covers manufactured of same material as pipe insulation when available.

2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 INSTALLATION OF MINERAL-FIBER PREFORMED PIPE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

B. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

C. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations

of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Underground piping.
 - 2. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 - 1. NPS 1 (DN 25) and Smaller: Insulation shall be the following:
 - a. Flexible Elastomeric: 1/2 inch (13 mm) thick.
 - 2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be the following:
 - a. Flexible Elastomeric: 1-inch (25 mm) thick.
- B. Domestic Hot and Recirculated Hot Water:
 - 1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1-inch (25 mm) thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-inch (25 mm) thick.
 - 2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be one of the following:
 - a. Flexible Elastomeric: 1-1/2-inches (38 mm) thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2-inches (38 mm) thick.

- C. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Protective shielding guards.
 - b. Protective lavatory shields.
- D. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- E. If more than one material is listed, selection from materials listed is Contractor's option.
- F. Piping, Concealed:
 - 1. None.
- G. Piping, Exposed to Occupant View:
 - 1. PVC: 30 mils (0.8 mm) thick.

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes domestic water pipes, tubes, and fittings inside buildings.

1.2 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.3 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B) water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K (ASTM B 88M, Type A) water tube, annealed temper.
- C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
- D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- E. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.

4. Solder-joint or threaded ends.

F. Copper Pressure-Seal-Joint Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Viega LLC, Wichita, KS - ProPress System with Smart Connect feature.
 - b. Or approved equal.
2. Fittings for NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM (color shiny black) in copper and stainless steel fittings for hydronic, potable water, and drain systems.
3. Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring type, factory installed in a fitting bead. Seals in larger sizes shall include a separator ring and a stainless steel grip ring.
4. Smart Connect feature provides a leakage path to allow water and air to leak past any unpressed connection, for quick identification during pressure testing.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.4 SOLDER MATERIALS:

A. Manufacturers:

1. Harris (Product: Stay-Brite).
2. Lucas-Milhaupt (Product: Silvabrite).
3. No substitutions.

B. Nominal Composition: Alloy of silver and tin (3-6 percent Ag, remainder Sn), lead and antimony-free.

C. Physical Properties:

1. Color: Bright Silver

2. Solidus: 430 degrees F (221 degrees C)
 3. Liquidus: 430 degrees F (221 degrees C)
 4. Electrical Conductivity: 16.4 percent IACS
 5. Shear Strength: 10,600 psi (73 MPa)
 6. Tensile Strength: 14,000 psi (96 MPa)
 7. Elongation: 48 percent
- D. Specification Compliance:
1. NSF 51
 2. ASTM B32-89, Alloy Grade Sn96
 3. Federal Spec. QQ-S-571E, Class Sn 96 with exception to QPL paragraph 3.1
 4. J-STD-006, Sn96Ag04A
- E. Flux: ASTM B 813, water flushable.
1. Harris (Product: Stay Clean Paste Flux, Stay Clean Liquid Flux (used with 4 inch or larger copper tubing also stainless steels), or Bridgit Water Soluble Paste Flux).
 2. Canfield (Product: Aqua-Brite or AB Cream Flux). Glycerin-based, water soluble.
- 2.5 TRANSITION FITTINGS
- A. General Requirements:
1. Same size as pipes to be joined.
 2. Pressure rating at least equal to pipes to be joined.
 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- 2.6 DIELECTRIC FITTINGS
- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
 - b. Central Plastics Company.
 - c. Hart Industries International, Inc.
 - d. Jomar International.
 - e. Matco-Norca.
 - f. McDonald, A. Y. Mfg. Co.
 - g. Watts; a division of Watts Water Technologies, Inc.
 - h. Wilkins; a Zurn company.
2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C). End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elster Perfection Corporation.
 - b. Grinnell Mechanical Products; Tyco Fire Products LP.
 - c. Matco-Norca.
 - d. Precision Plumbing Products, Inc.
 - e. Victaulic Company.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F1545.
4. Pressure Rating and Temperature: 300 psig (2,070 kPa) at 225 deg F (107 deg C).
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install water piping level with 0.25 percent slope downward toward drain and plumb.
- E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping to permit valve servicing.
- I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- M. Install thermometers where indicated and detailed. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."
- N. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

- O. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.

3.4 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings: Use dielectric couplings or nipples.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.

2. Individual, Straight, Horizontal Piping Runs: MSS Type 1, adjustable, steel clevis or J-type hangers.
 - B. Support vertical piping and tubing at base and at each floor.
 - C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).
 - D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
 3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
 - E. Install supports for vertical copper tubing at top and bottom of riser, and at no more than 8 feet (2.4 m) on center.
 - F. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

3.7 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

- B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

- 1. Piping Inspections:

- a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
- b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
- c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
- d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

- 2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.

- f. Prepare reports for tests and for corrective action required.
 - B. Domestic water piping will be considered defective if it does not pass tests and inspections.
 - C. Prepare test and inspection reports.
- 3.9 ADJUSTING
- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 - 5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 8. Check plumbing specialties and verify proper settings, adjustments, and operation.
- 3.10 CLEANING
- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

- b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.11 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for piping joints unless otherwise indicated.
- C. Domestic water piping shall be the following:
 - 1. Piping within 10 feet (3 m) of the water heater or boiler, measured along the run of piping, shall be hard copper tubing.
 - a. Hard copper tube, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
 - b. Hard copper tube, Type L; solder-joint fittings; and soldered joints.
 - 2. Piping farther from the water heater or boiler, and runouts to individual fixtures, shall be hard copper tubing.
 - a. Hard copper tube, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
 - b. Hard copper tube, Type L; solder-joint fittings; and soldered joints.
 - 3. Concealed and underslab runouts to trap primer fittings on floor drains and similar fixtures shall be hard copper tubing.

- a. Hard copper tube, Type K; solder-joint fittings; and soldered joints.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vacuum breakers.
 - 2. Balancing valves.
 - 3. Temperature-actuated, water mixing valves.
 - 4. Water-hammer arresters.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 Annex G. Mark "NSF-pw" on plastic piping components.

2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa) unless otherwise indicated.

2.3 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.

- b. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
 - c. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1001.
 3. Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.
 4. Body: Bronze.
 5. Inlet and Outlet Connections: Threaded.
 6. Finish: Rough bronze.

2.4 BALANCING VALVES

A. Memory-Stop Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Flo Fab Inc.
 - c. ITT Corporation; Bell & Gossett Div.
 - d. NIBCO Inc.
 - e. TACO Incorporated.
 - f. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
2. Type: Ball or Y-pattern globe valve with two readout ports and memory-setting indicator.
3. Pressure Rating: 200-psig (1380-kPa) minimum CWP.
4. Size: NPS 2 (DN 50) or smaller.
5. Body: Copper alloy.
6. Port: Standard or full port.
7. Ball: Chrome-plated brass.
8. Seats and Seals: Replaceable.

9. End Connections: Solder joint or threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

2.5 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Leonard Valve Company.
 - b. Watts Water Technologies, Inc.
 - c. Symmons Industries, Inc.
2. Standard: ASSE 1070.
3. Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.
4. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Tempered-Water Setting: 110° F (49° C).
8. Valve Finish: Rough bronze.
9. Piping Finish: Copper.

2.6 WATER-HAMMER ARRESTERS

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

1. AMTROL, Inc.
2. Josam Company.
3. MIFAB, Inc.
4. Precision Plumbing Products, Inc.
5. Sioux Chief Mfg. Co., Inc.
6. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
7. Tyler Pipe; Wade Div.

8. Watts Drainage Products.
 9. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.
- B. Standard: ASSE 1010 or PDI-WH 201.
 - C. Type: Metal bellows, or copper tube with piston.
 - D. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.
 - E. Provide sizes, quantities, and locations in accordance with PDI-WH 201 as referenced in Part 3 of this Specification.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install balancing valves in locations where they can easily be adjusted.
- B. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
- C. Install water-hammer arresters in water piping according to PDI-WH 201. Provide whether or not indicated on Drawings. Locate as recommended by the manufacturer. As a minimum, provide one in the cold water piping branch to the water closets in each toilet room, in the hot and cold water piping branches to shower rooms, and in the hot and cold water piping branches to the laundry. Contractor is responsible for sizing unless otherwise indicated.

3.2 CONNECTIONS

- A. Comply with requirements for ground equipment in Division 9 – Electrical.
- B. Fire-retardant-treated-wood blocking for electrical connections is specified in Division 9 – Electrical.

3.3 LABELING AND IDENTIFYING

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 “Identification for Plumbing Piping and Equipment.”

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 1. Test each vacuum breaker and backflow preventer according to authorities having jurisdiction and the device’s reference standard.

- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Set field-adjustable flow set points of balancing valves.
- B. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Hub-and-spigot, cast-iron soil pipe and fittings.
 - 2. Hubless, cast-iron soil pipe and fittings.
 - 3. Ductile-iron pipe and fittings.
 - 4. Copper tube and fittings.
 - 5. Specialty pipe fittings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

2.2 PIPING MATERIALS

- A. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International.
- B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: Service class(es). All cast iron drain waste, vent, sewer and storm lines shall be of cast iron soil pipe and fittings conforming to the requirements of ASTM A74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International.
- B. Gaskets: Compression Gaskets for Hub & Spigot shall conform to the requirements of ASTM Standard C 564 and ASTM C 1563.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: All cast iron drain waste, vent, sewer and storm lines shall be cast iron soil pipe and fittings conforming to the requirements of CISPI 301 or ASTM A888. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky.
 - b. Charlotte Pipe and Foundry Company.
 - c. Tyler Pipe; a subsidiary of McWane Inc.

2. Standards: Shall conform to the requirements of CISPI 310 and shall be listed by NSF International.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ANACO-Husky.
 - b. Charlotte Pipe and Foundry Company.
 - c. Tyler Pipe; a subsidiary of McWane Inc.
2. Standards: Shall conform to the requirements of ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.5 DUCTILE-IRON PIPE AND FITTINGS

A. Ductile-Iron, Mechanical-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot ends unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Ductile-Iron, Push-on-Joint Piping:

1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot ends unless grooved or flanged ends are indicated.
2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
3. Gaskets: AWWA C111/A21.11, rubber.

2.6 COPPER TUBE AND FITTINGS

- A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- C. Hard Copper Tube: ASTM B 88, Type L and Type M, water tube, drawn temper.
- D. Copper Pressure Fittings:

1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
- E. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- F. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.7 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 1. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 2. Shielded, Nonpressure Transition Couplings:
 - a. Standard: ASTM C 1460.
 - b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - c. End Connections: Same size as and compatible with pipes to be joined.
 3. Pressure Transition Couplings:
 - a. Standard: AWWA C219.
 - b. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
 - c. Center-Sleeve Material: Manufacturer's standard.
 - d. Gasket Material: Natural or synthetic rubber.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- B. Dielectric Fittings:
 1. Dielectric Unions:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 125 psig minimum at 180 deg F.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
 2. Dielectric Flanges:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 125 psig minimum at 180 deg F.

- 4) End Connections: Solder-joint copper alloy and threaded ferrous;
threaded solder-joint copper alloy and threaded ferrous.
3. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: 150 psig.
 - 3) Gasket: Neoprene or phenolic.
 - 4) Bolt Sleeves: Phenolic or polyethylene.
 - 5) Washers: Phenolic with steel backing washers.
4. Dielectric Nipples:
 - a. Description:
 - 1) Standard: IAPMO PS 66.
 - 2) Electroplated steel nipple.
 - 3) Pressure Rating: 300 psig at 225 deg F.
 - 4) End Connections: Male threaded or grooved.
 - 5) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
 - 2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.
- K. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- N. Install joints for pipe and fittings according to the manufacturer's installation instructions and local code requirements.
- O. Install steel piping according to applicable plumbing code.
- P. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

- Q. Install engineered soil and waste and vent piping systems as follows:
1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
 2. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.
- R. Plumbing Specialties:
1. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 - a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
 - b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
 2. Install drains in sanitary waste gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."
- S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- T. Install sleeves for piping penetrations of walls, ceilings, and floors.
1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- U. Install sleeve seals for piping penetrations of concrete walls and slabs.
1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- V. Install escutcheons for piping penetrations of walls, ceilings, and floors.
1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

- D. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
- E. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in ODs.
 - 2. In Waste Drainage Piping: Shielded, nonpressure transition couplings.
- B. Dielectric Fittings:
 - 1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - 2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples.
 - 3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
 - 4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 4. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support horizontal piping and tubing within 12 inches of each fitting and coupling.
- D. Support vertical piping and tubing at base and at each floor.

- E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
 - 6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 4. NPS 3 and NPS 5: 10 feet with 1/2-inch rod.
 - 5. NPS 6: 10 feet with 5/8-inch rod.
 - 6. NPS 8: 10 feet with 3/4-inch rod.
- I. Install supports for vertical copper tubing every 10 feet.
- J. Install hangers for special waste piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.
- K. Install supports for vertical special waste piping every 48 inches.
- L. Support piping and tubing not listed above according to MSS SP-58 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 5. Comply with requirements for cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."
- D. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- E. Make connections according to the following unless otherwise indicated:
1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.7 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.
- B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
 - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
 - a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
 - a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
 - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
 - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
 - d. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.9 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Repair damage to adjacent materials caused by waste and vent piping installation.

3.10 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground or below ground, soil, waste and vent piping NPS 8 and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; CISPI or heavy-duty hubless-piping couplings; and coupled joints.
 - 3. Copper Type DWV tube, copper drainage fittings, and soldered joints.
 - 4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

END OF SECTION 221316

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Roof flashing assemblies.
4. Miscellaneous sanitary drainage piping specialties.
5. Flashing materials.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for grease interceptors.

1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Josam Company.
 - 2) MIFAB, Inc.
 - 3) Smith, Jay R. Mfg. Co.
 - 4) Tyler Pipe.
 - 5) Watts Drainage Products.
 - 6) Zurn Plumbing Products Group.

B. Metal Floor Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Josam Company.
 - 2) Sioux Chief Manufacturing Co., Inc.
 - 3) Smith, Jay R. Mfg. Co.
 - 4) Tyler Pipe.
 - 5) Watts Drainage Products.
2. Standard: ASME A112.36.2M for adjustable housing cast-iron soil pipe with cast-iron ferrule cleanout.
3. Size: Same as connected branch.
4. Type: Adjustable housing Cast-iron soil pipe with cast-iron ferrule.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Required.
7. Closure: Brass plug with straight threads and gasket.
8. Adjustable Housing Material: Cast iron with threads.
9. Frame and Cover Material and Finish: Stainless steel.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Heavy Duty.
12. Riser: ASTM A74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
13. Standard: ASME A112.3.1.
14. Size: Same as connected branch.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.

- b. Smith, Jay R. Mfg. Co.
 - c. Tyler Pipe; Wade Div.
 - d. Watts Drainage Products.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
 3. Size: Same as connected drainage piping.
 4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
 5. Closure: Countersunk, brass plug.
 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 7. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Watts Drainage Products.
 - e. Zurn Plumbing Products Group.
2. Standard: ASME A112.6.3. Pattern: Floor drain.
3. Body Material: Gray iron.
4. Seepage Flange: Required.
5. Anchor Flange: Required.
6. Clamping Device: Required, reversible with weepholes.
7. Outlet: Bottom. 3-inch (76-mm) pipe size, unless otherwise indicated on Drawings.

8. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.
9. Top of Body and Strainer Finish: Nickel bronze.
10. Top Shape: Round. Nominal 7 inch (178 mm) diameter strainer.

2.3 FLOOR DRAIN TRAP SEAL PROTECTION DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Sure Seal Mfg. – SureSeal inline floor drain trap sealer.
 2. Provent Systems Inc. – ProSet Trap Guard.
 3. MIFAB Inc. – MI-GARD Series floor drain trap seal.
- B. Standards: ASSE 1072. IAPMO listed, or ICC-ES listed.
- C. Compatibility: Manufacturer shall verify compatibility with the floor drain or other device being protected. Verify compatibility with the flooring type; for example, some devices are not listed for use in wood flooring. Verify compatibility with the flowing fluid; for example, some devices are not listed for use with greasy waste water.
- D. Body: Plastic or rubber, with outer seal to interior of drain body.
- E. Closure: Hinged rigid plastic elements with edge gaskets, rubber sealing flapper which seats against body opening, or duckbill style elastomeric tube.
- F. Sealing Element: Soft gasket of EPDM or silicon rubber, or other durable elastomeric material.
- G. Seal of Body to Drain: Soft gasket of EPDM or silicon rubber.
 1. Operation: Device installs at outlet of drain body, upstream of and above the water-seal trap. Device is friction-fit into drain, and is removable and replaceable. Normally-closed sealing element closes under no-flow condition, to block evaporation of water in drain trap.

2.4 ROOF FLASHING ASSEMBLIES

- A. Roof Flashing Assemblies:
 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. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.

2. Description: Manufactured assembly made of 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch - (1.6-mm-) thick, lead flashing collar and skirt extending at least 6 inches (150 mm) from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

- a. Open-Top Vent Cap: Without cap.

2.5 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

B. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1-inch (25 mm) above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

C. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

D. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

E. Expansion Joints:

1. Standard: ASME A112.21.2M.

2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

2.6 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 1. General Use: 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
 2. Vent Pipe Flashing: 3.0-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
 3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Solder: ASTM B 32, lead-free alloy.
- E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with adjustable top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

- D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches (750 mm) or Less: Equivalent to 1 percent slope, but not less than 1/4-inch (6.35-mm) total depression.
 - b. Radius, 30 to 60 Inches (750 to 1500 mm): Equivalent to 1 percent slope.
 - c. Radius, 60 Inches (1500 mm) or Larger: Equivalent to 1 percent slope, but not greater than 1-inch (25-mm) total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
 - 5. Provide trap seal protection devices in floor drains and similar fixtures. Do not provide in shower stall drains, to avoid clogging with hair.
- E. Provide trap seal protection devices, or water-type trap primers, for indirect waste standpipes and similar devices for which flow of drainage is intermittent.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- I. Install floor-drain, trap-seal devices in the outlet connections of floor drains, hopper drains, and similar devices.
- J. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- K. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- L. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 CONNECTIONS

- A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 076200 "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water closets.
2. Toilet seats.
3. Carriers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 FLOOR-MOUNTED, BOTTOM-OUTLET TANK TYPE WATER CLOSETS

A. Water Closets: Floor mounted, bottom outlet, tank type.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard.
 - b. Kohler.
 - c. Sloan Valve Co.
 - d. Toto USA, Inc.
2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Style: Tank type.

- d. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
 - e. Rim Contour: Elongated.
 - f. Maximum Water Consumption: 1.28 gal. (4.8 L) per flush.
 - g. Color: White.
3. Bowl-to-Drain Connecting Fitting: ASME A112.4.3.

2.2 TOILET SEATS

A. Toilet Seats:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard America.
 - b. Bemis Manufacturing Company.
 - c. Church Seats; Bemis Manufacturing Company.
 - d. Kohler Co.
 - e. Olsonite Seat Co.
 - f. TOTO USA, INC.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: None.
9. Color: White.

2.3 WATER CLOSET CARRIERS

- ### A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Jay R. Smith.

2. Josam.
 3. MIFAB, Inc.
 4. Watts.
 5. Zurn.
- B. Standard: ASME A112.6.1M up to a 750-lb (350 kg) load unless otherwise indicated.
- C. Floor mounted, epoxy coated cast iron fitting, waste and vent connections, compression seal faceplate assembly, cast iron foot supports, adjustable for standard and wheelchair height, adjustable ABS nipple with integral test cap and neoprene bowl gasket, plated hardware and chrome plated cap nuts.
1. Coupling with seal, and fixture bolts and hardware matching fixture.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Water-Closet Installation:
1. Install level and plumb according to roughing-in drawings.
 2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
 3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.
- B. Support Installation:
1. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
- C. Install toilet seats on water closets.
- D. Wall Flange and Escutcheon Installation:
1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
 2. Install deep-pattern escutcheons if required to conceal protruding fittings.
 3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Joint Sealing:

1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Division 7 Section "Joint Sealants."

3.2 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."
- D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.3 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

3.4 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224213.16 - COMMERCIAL URINALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Urinals.
2. Flushometer valves.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 WALL-HUNG URINALS

- A. Urinals: Wall hung, bottom outlet, washout.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard.
 - b. Kohler.
 - c. Sloan Valve Co.
 - d. Toto USA, Inc.
 2. Fixture:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
 - d. Drain Strainer: Provide separate removable stainless steel dome strainer with fastening hardware.

- e. Design Consumption: Water saving as indicated on Drawings.
 - f. Inlet Spud Size and Location: NPS 3/4 (DN 20); top.
 - g. Outlet Size and Location: NPS 1-1/2 (DN 40); bottom.
 - h. Color: White.
3. Flushometer Valve: See "Urinal Flushometer Valves" this Section.
 4. Waste Fitting:
 - a. Standard: ASME A112.18.2/CSA B125.2.
 - b. Trap: Size: NPS 1-1/2 (DN 50).
 5. Support: Urinal carrier.

2.2 URINAL FLUSHOMETER VALVES

A. Solenoid-Actuator, Diaphragm Flushometer Valves:

1. Subject to compliance with requirements, provide product indicated on Drawings by the following:
 - a. Toto USA, Inc.
 - b. Or Approved, Equal.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Trip Mechanism: Battery-powered electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application. Battery may include self-charging mechanism.

11. Consumption: Water saving, as indicated on Drawings.
12. Minimum Inlet: NPS 3/4 (DN 20).
13. Minimum Outlet: NPS 3/4 (DN 20).

B. Manual, Lever-Handle, Diaphragm Flushometer Valves:

1. Subject to compliance with requirements, provide product indicated on Drawings by the following:
 - a. Sloan Valve Company.
 - b. No substitutions.
2. Standards: ASSE 1037, and ANSI/ASME A112.19.2.
3. Minimum Pressure Rating: 125 psig (860 kPa).
4. Features:
 - a. Manual type.
 - b. ADA compliant oscillating non-hold-open handle with triple seal handle packing.
 - c. Fixed metering bypass and no external volume adjustment to ensure water conservation.
 - d. Integral screwdriver angle check stop and backflow-prevention device. Free-spinning vandal-resistant stop cap.
 - e. Dual filtered fixed bypass diaphragm.
 - f. Inlet: Sweat solder adapter with cover tube and cast wall flange with set screw.
 - g. Outlet: Adjustable tailpiece. High-backpressure vacuum breaker flush connection with one-piece bottom hex coupling nut. Spud coupling and flange for top spud.
5. Materials:
 - a. Valve body, cover, tailpiece, and control stop shall conform to ASTM alloy classification for semi-red brass. High copper, low zinc brass castings for dezincification resistance.
 - b. Diaphragm, handle packing, stop seat, and vacuum breaker shall be molded from chloramine-resistant synthetic rubber.
6. Exposed Flushometer-Valve Finish: Chrome plated.

7. Style: Exposed.
8. Consumption: As required by urinal, 0.5 gal. (1.9 L) per flush unless otherwise indicated.
9. Minimum Inlet: NPS 3/4 (DN 20).
10. Minimum Outlet: NPS 3/4 (DN 20).

2.3 SUPPORTS

A. Urinal Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg. Co.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Watts; a Watts Water Technologies company.
 - e. Zurn Industries, LLC.
2. Standard: ASME A112.6.1M.
3. Floor mounted, steel with rectangular uprights, hanger plate and bearing plate.
4. Coupling with seal, and fixture bolts and hardware matching fixture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
- B. Examine walls and floors for suitable conditions where urinals will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.

3. Install accessible, wall-mounted urinals at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.
- B. Support Installation:
1. Install supports, affixed to building substrate.
 2. Use chair-type carrier supports with rectangular steel uprights. Anchor to floor.
- C. Flushometer-Valve Installation:
1. Install flushometer-valve water-supply fitting on each supply to each urinal.
 2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
 3. Install flushometer valves for accessible urinals with automatic flushometer manual override or manual lever handle mounted on open side of compartment.
 4. Install fresh batteries in battery-powered, electronic-sensor mechanisms.
- D. Wall Flange and Escutcheon Installation:
1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
 2. Install deep-pattern escutcheons if required to conceal protruding fittings.
 3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- E. Joint Sealing:
1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
 2. Match sealant color to urinal color.
 3. Comply with sealant requirements specified in Division 7 Section "Joint Sealants."
- 3.3 CONNECTIONS
- A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

- D. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

- A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.
- C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

- A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed urinals and fittings.
- C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.16

SECTION 224216.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatories.
2. Faucets.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Servicing and adjustments of automatic faucets.

PART 2 – PRODUCTS – BASE BID

2.1 ONE-PIECE SOLID SURFACE MANUFACTURED LAVATORY SYSTEM

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Bradley Corporation.
 - b. ADA/ABA compliant, wall-mounted, multi-level two-station lavatory, LAV# FL-2H.
 - c. Constructed of solid surface material with wave formed contoured deck, integral ergonomic multi-height bowls, coved integral backsplash, with electrically operated electronic sensor-operated faucets.
 - d. Unit includes waste and supply connections to wall with stop, strainer, check valves, stainless steel support brackets and high-impact polymer trap enclosure.
 - e. Overall Unit Size: 60 inches by 22 inches with 2-bowls.

- f. Bowl Size: Rectangular with rounded front, 17 inches by 13 inches, on 30 inch centers.
- g. Faucet: Manufacturer's standard.
- h. Water Supply: Thermostatic mixing valve assembly.
- i. Colors: Bowl/Deck and Trap Enclosure Covers shall be as selected by Architect from manufacturer's standard colors available.

PART 2 – PRODUCTS – DEDUCT ALTERNATE

2.2 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

- A. Lavatory: Vitreous china, counter mounted self-rimming.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Standard.
 - b. Kohler.
 - c. Toto USA, Inc.
 - 2. Fixture:
 - a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: Self-Rimming.
 - c. Nominal Size: As noted on the drawings.
 - d. Faucet-Hole Punching: As noted on the drawings.
 - e. Faucet-Hole Location: Top.
 - f. Color: Cotton.
 - g. Mounting Material: Sealant.

2.3 SOLID-BRASS, MANUALLY OPERATED FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Manual-type, commercial, solid-brass valve.
 - 1. Subject to compliance with requirements, provide product indicated on Drawings by the following:
 - a. Symmons Industries.

- b. Zurn
- c. Approved Equal
- 2. Standard: ASME A112.18.1/CSA B125.1, ANSI/NSF 372.
- 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
- 4. Body Material: Commercial, solid brass.
- 5. Finish: Polished chrome plate.
- 6. Mounting Type: Deck, exposed.
- 7. Valve Handle: ADA compliant wrist blade type.
- 8. Mixing Valve: ASSE 1070 listed
- 9. Spout: Rigid type.
- 10. Spout Outlet: Vandal resistant. At least 1-1/2 inches (38 mm) above sink rim to centerline.
- 11. Drain Assembly: Metal, grid strainer.

2.4 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
 - 1. NPS 3/8 (DN 10).
 - 2. Chrome-plated, soft-copper flexible tube riser.

2.5 WASTE FITTINGS

- A. Standard: ASME A112.18.2/CSA B125.2.

- B. Drain: Grid type with NPS 1-1/4 (DN 32) offset and straight tailpiece.
- C. Trap:
 - 1. Size: NPS 1-1/2 by NPS 1-1/4 (DN 40 by DN 32).
 - 2. Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch- (0.83-mm-) thick brass tube to wall; and chrome-plated, brass or stainless steel wall flange.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- E. Seal joints between lavatories and counters and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."
- F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

- B. Adjust time and temperature stops on faucets.

3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 230500 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide labor, materials, accessories, and other related items as required to complete operations in connection with the complete installation of the HVAC and mechanical systems as indicated on the Drawings and as specified herein.

1.2 RELATED REQUIREMENTS

- A. Conditions of the Contract apply to the work, including the work of this Division. Examine Contract Documents for requirements affecting the work.
- B. Provide cooperation with, and assistance to, the Testing and Balancing (TAB) Agent specified in Division 23 Section “Testing, Adjusting, and Balancing for Mechanical Systems.”

1.3 MECHANICAL PRE-CONSTRUCTION MEETING

- A. Conduct a mechanical conference at Project site to comply with requirements of Division 01 Section “Project Management and Coordination” and the following:
 - 1. At least 14 days prior to beginning of mechanical work, conduct a meeting to review detailed requirements for mechanical systems installation and testing requirements. Review mechanical Drawings and Specifications, discuss project specific details and requirements, and review and discuss expectations for quality control. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with mechanical systems installation to attend conference, including, but not limited to, the following:
 - a. General Contractor's superintendent.
 - b. Mechanical Subcontractors' project managers.
 - c. Mechanical Subcontractors' job foremen.
 - d. Sheetmetal job foreman.
 - e. Plumbing job foreman.
 - f. Controls job foreman.
 - g. Project mechanical Engineer/designer.
 - h. Architect's construction administrator.

1.4 DRAWINGS

- A. The general location of the apparatus and the details of the work are indicated on the Drawings. Exact locations not indicated shall be determined at the site as the work progresses and shall be subject to the Architect's approval.
- B. It is not intended that the Drawings shall show every pipe, pipe rise, pipe drop, duct rise, duct drop, pipe fitting, duct fitting, or appliance, but it shall be a requirement to furnish, without additional expense, material and labor necessary to complete the systems in accordance with the design intent and with the highest possible quality available.

1.5 ALTERATIONS

- A. Execute alterations, additions, removals, relocations, new work, and other related items as indicated or required to provide a complete installation in accordance with the intent of the Contract Documents, including changes required by building alterations.
- B. Existing work disturbed or damaged by the alterations or the new work shall be repaired or replaced to the Architect's satisfaction and at no additional cost to the Owner.
- C. Existing ductwork, piping, and other systems indicated to be removed, shall be removed from the site. Cap off existing services remaining. The Owner retains the right to ownership of heating and ventilating equipment scheduled to be removed; store such equipment where requested by the Owner. Material not retained by the Owner shall be removed from the site.

1.6 CONTINUITY OF SERVICE

- A. Arrange to execute the work at such times and in such locations as may be required to provide uninterrupted service for the building or any of its locations. Any unavoidable conditions requiring reduced building capacity shall be arranged for by programming with the Owner's duly authorized representative at the building subject to the Architect's approval. If necessary, temporary work shall be installed to provide for the condition. Authorization for interrupting service shall be obtained in writing from the Owner. Any interruption of normal service shall be performed during an overtime period to be scheduled with the Owner. Costs for overtime work shall be included in the bid.

1.7 REQUIREMENTS

- A. Installation Instructions: Obtain manufacturer's printed installation instructions to aid in properly executing work on major pieces of equipment. Install equipment in accordance with manufacturer's recommendations.
- B. Objectionable Noise, Fumes and Vibration:
 - 1. Mechanical and electrical equipment shall operate without creating objectionable noise, fumes, or vibration, as determined by the Architect.

2. If such objectionable noise, fumes, or vibration is produced and transmitted to occupied portions of building by apparatus, piping, ducts, or any other part of mechanical and electrical work, make necessary changes and additions, as approved, without extra cost to Owner.
- C. Equipment Design and Installation:
1. Uniformity: Unless otherwise specified, equipment or material of same type or classification, used for same purposes, shall be product of same manufacturer.
 2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog number shall be designed in conformity with ASME, IEEE, or other applicable technical standards, suitable for maximum working pressure, and with neat and finished appearance.
 3. Installation: Erect equipment aligned, level and adjusted for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily, and so that parts are easily accessible for inspection, operation, maintenance and repair. Minor deviations from indicated arrangements may be made, as approved.
- D. Protection of Equipment and Materials: Responsibility for care and protection of materials and mechanical work rests with the Contractor until the entire project has been completed, tested and the project is accepted by the Owner.
- E. Foundations:
1. Ceiling Mounting: Where ceiling mounting is indicated or specified, use suspended platform or strap hangers, bracket or shelf, whichever is most suitable for equipment and its location. Construct of structural steel members, steel plates, or rods, as required; brace and fasten to building structure or to inserts as approved, or as detailed.
 2. Where floor mounting is indicated, locate equipment on 4 inch (102 mm) high reinforced concrete pad of adequate size with anchors and base plates as required, on pressure-treated sleepers, or on structural steel frame as detailed. The corners of pads shall be chamfered 1 inch (25 mm). Pad and steel sizes and location shall be coordinated with the approved equipment.
- 1.8 ELECTRIC WORK
- A. Provide motors, pilot lights, controllers, limit switches, and other related items for equipment provided under Division 23.
 - B. Except as noted, required line switches, fused switches, and other related items and necessary wiring to properly connect equipment to motors and switches shall be furnished and installed under Division 26, Electric.
 - C. Provide complete wiring system for automatic temperature controls as specified under Section Division 23 Section “Instrumentation and Controls for Mechanical Systems.”

- D. Wiring shall conform to the requirements of the National Electrical Code.

1.9 SUBMITTALS

- A. After award of Contract and before installation, submit for approval Shop Drawings, bulletins, Product Data, Samples, and other related items.
- B. Submit Shop Drawings and Product Data as required in each Section. Submittal shall include physical data and performance data required to verify compliance with the Contract Documents.
- C. Submit Samples as required in each Section, and as indicated on the Drawings. These will generally be retained by the Architect/Engineer, unless otherwise indicated. Contractor may request these items returned; provide return shipping for returns.
- D. Architect/Engineer's review will not include the review, coordination, or verification of dimensions or quantities; these shall be the responsibility of the Contractor.

1.10 SUBSTITUTIONS

- A. Comply with provisions of the Instructions to Bidders and General Conditions.
- B. The "Manufacturer" listed on the drawings is the design basis.
 - 1. Other manufacturers listed may be used in the base bid, but conformance with details of the Specifications, as well as dimensional and electrical data, shall be verified by the Contractor.
 - 2. Architect/Engineer has not verified that each listed manufacturer has the ability to provide an acceptable substitution for the basis-of-design product. Contractor may not assume that substitutions will be approved.
 - 3. Modifications required as a result of differences between the design basis item and the submitted and approved item must be approved by the Architect and made at the Contractor's expense. As an example, if a rooftop HVAC unit is submitted and approved and if the unit's dimensions and weight are different from those of the unit which was used as the design basis, the Contractor shall be responsible for building structural modifications required to accommodate the submitted and approved unit, at no additional cost to the Owner.
 - 4. When, in the Architect or Engineer's opinion, architectural or engineering services are necessary for the coordination of substituted items, the Contractor shall reimburse the Owner for the cost of these services.
 - 5. For items which have no manufacturers listed, any item conforming with the Contract Documents is acceptable.

- C. Substitutions from manufacturers or providers which are not listed may be proposed within the time allowed in the General Conditions of the Specifications.
 - 1. The exception to this is products for which the list of manufacturers or providers is limited by the wording “no substitutions” or similar wording.

1.11 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Divisions having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of work of separate Sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.12 COORDINATION DRAWINGS

- A. As a requirement of this Specification, the Contractor shall participate in the development of a set of common coordination drawings for the project.
- B. The HVAC Mechanical Subcontractor shall be responsible to manage the coordination drawing effort and submit the drawings as shop drawings for review and comment. The HVAC Mechanical Subcontractor shall develop the base floor plans and building sections and place his mechanical equipment ductwork and piping on them. He shall then coordinate and manage each trade's effort while they place their information on the same drawings.
- C. Each Trade: Plumbing, fire protection and electrical shall work with the HVAC Mechanical Subcontractor to help produce the coordination drawings. Each trade shall be responsible to coordinate their own equipment, piping, conduit, tray and other associated materials with the other trades and place this information on the drawings.
- D. The coordination drawings may be CAD or hand drafted as selected by the HVAC

Mechanical Subcontractor. Floor plans shall be prepared at a minimum scale of 1/4 inch = 1 ft. Sections through the entire building shall be prepared at a minimum scale of 1/4 inch = 1 ft. Detail sections across corridors or other small areas shall be prepared at a minimum scale of 1 inch = 1 ft.

- E. Prepare coordination drawings for both existing and new areas of the facility. The drawing detail shall be sufficient to ensure coordination between the trades and also with the building structure. As a minimum the following shall be shown in plan and section:
1. Building structure.
 2. Major equipment.
 3. Ceiling-mounted equipment in ceiling grid, such as lighting fixtures, HVAC diffusers, and sprinklers.
 4. Ceilings in elevation
 5. Duct work
 6. Major duct, pipe, conduit and tray runs
 7. Work in corridors
 8. Single pipe and conduits run outside of corridor areas when greater than 1-1/2 inch (38 mm) in nominal diameter.
 9. As a minimum, indicate elevation of sprinkler piping in all areas.
- F. Mechanical HVAC, plumbing and electrical construction shall not commence until coordination drawings have been reviewed. The Contractor shall bring any coordination issues to the attention of the Architect. Review of the coordination drawings by the Architect does not relieve the Contractor of his/her responsibility to provide a properly coordinated construction project.

1.13 REQUESTS FOR ARCHITECT'S CADD DRAWINGS

- A. In lieu of generating their own CADD drawings, the Contractor may elect to use the Architect's electronic copies of CADD drawings for the purpose of developing coordination drawings, developing control system graphics or for other reasons that pertain to the requirements of this Contract. If the Contractor elects to utilize the Architect's electronic copies of CADD drawings, the electronic files shall be purchased from the Architect at the Architect's current billing rate per drawing. The Contractor shall provide payment and shall sign a release-of-liability form before electronic CADD drawings are released.

1.14 CLEANING

- A. Remove debris from site daily.

- B. Material and pieces of equipment shall be turned over to the Owner free of dust and dirt, both inside and out.
- C. At the completion of the Project, equipment shall have a clean, neat appearance of factory finish by cleaning or repainting as required.
- D. At the completion of the Project, surfaces exposed to view shall have a clean, neat appearance of finish free from smudges and scratches by cleaning or repainting as required.

1.15 STARTING SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer 7 days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of responsible manufacturer's representative in accordance with manufacturer's instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

1.16 ADJUSTMENTS AND OWNER'S INSTRUCTIONS

- A. After completion of the installation work called for in the Contract Documents, furnish necessary mechanics or engineers for the adjustment and operation of the systems, to the end that the systems are perfectly adjusted and turned over to the Owner in perfect working order. Further instruct the Owner's authorized representative in the care and operation of the installation, providing framed instruction charts, directions, and other related items.
- B. Instructors providing Owner training shall be experienced and familiar with the jobsite.

1.17 TESTING

- A. After the entire installation is completed and ready for operation, test the systems as

outlined in Division 23 Section “Testing, Adjusting and Balancing for Mechanical Systems.” These tests are supplementary to detailed tests specified herein or directed. The Owner will provide water and electric current for the test. Provide necessary labor, test pump, gauges, meters, other instruments, and materials. Perform tests in the presence of the Architect or his representative.

- B. Perform other tests specified in individual Sections of this Specification.

1.18 COMPLETION OF SYSTEMS

- A. The following mechanical systems shall not be complete until the following conditions are satisfied:

- 1. Ductwork Systems:

- a. Ductwork and related components and accessories shall be completely installed and insulated as specified.
 - b. Ductwork shall be balanced and a balancing report shall be submitted and approved.

- 2. Piping Systems:

- a. Piping, valves and accessories shall be completely installed, insulated and labeled as specified.
 - b. Piping pressure testing be completed and pressure testing reports shall be submitted and approved.
 - c. Piping systems shall be balanced and a balancing report shall be submitted and approved.

- 3. Equipment:

- d. Equipment, including but not limited air handling units and exhaust fans, shall be completely installed.
 - e. Equipment start-up reports shall be completed, submitted and approved.
 - f. Equipment balancing shall be completed and the balancing report shall be submitted and approved.

- 3. Automatic Temperature Controls (ATC):

- a. ATC system shall be completely installed.

1.19 OPERATING AND MAINTENANCE MANUALS

- A. Furnish 2 bound operating and maintenance manuals and forward to the Architect for review and transmittal to the Owner.

- B. For maintenance purposes, provide approved Submittals, parts lists, specifications, and manufacturer's maintenance bulletins for each piece of equipment. For materials used which have been submitted to the Architect for approval but do not require regular maintenance, such as piping, ductwork, and insulation, provide one copy of approved Submittals.
- C. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment or material so that service or spare parts can be readily obtained.

1.20 WARRANTY

- A. Provide guarantees and warranties for work under this Contract as indicated in the general requirements of the Contract.
- B. Provide manufacturers' standard warranties and guarantees for work by the mechanical trades. However, such warranties and guarantees shall be in addition to and not in lieu of other liabilities which the manufacturer and the Mechanical Contractor may have by law or by other provisions of the Contract Documents.
- C. Guarantee that elements of the systems provided under this Contract are of sufficient capacity to meet the specified performance requirements as set forth in these Specifications or as indicated on the Drawings.
- C. Upon receipt of notice from the Owner of failure of any part of the mechanical systems or equipment during the warranty period, the Mechanical Subcontractor shall replace the affected part or parts.
- D. Furnish a written guarantee covering the above requirements before submitting the application for final payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 230500

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal fittings.
 - 3. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop collar.
- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, anti-corrosion coated or zinc coated, with plain ends and integral welded waterstop collar.

- D. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. GPT; an EnPro Industries company.
 - 3. Metraflex Company (The).
- B. Description:
 - 1. Manufactured plastic, sleeve-type, waterstop assembly, made for imbedding in concrete slab or wall.
 - 2. Plastic or rubber waterstop collar with center opening to match piping OD.

2.3 GROUT

- A. Description: Nonshrink, recommended for interior and exterior sealing openings in nonfire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Using grout, seal space outside of sleeves in slabs and walls without sleeve-seal system.

- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use sealants appropriate for size, depth, and location of joint.

3.2 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings as new walls and slabs are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Using grout, seal space around outside of sleeve-seal fittings.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
- B. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

3.4 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls Above Grade:
 - a. Piping Smaller Than NPS 6: Cast-iron sleeves or Steel pipe sleeves with Sleeve-seal fittings.
 - 2. Concrete Slabs Above Grade:
 - a. Piping Smaller Than NPS 6: Steel pipe sleeves Sleeve-seal fittings.
 - 3. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Steel pipe sleeves.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Escutcheons.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

- 1. Or approved equal.
- 2. BrassCraft Manufacturing Co.; a Masco company.
- 3. Dearborn Brass.
- 4. Keeney Manufacturing Company (The).

2.2 ESCUTCHEONS

- A. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
- B. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.
- C. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
- D. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished, chrome-plated finish and spring-clip fasteners.

- E. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.
- F. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping and Relocated Existing Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
 - b. Insulated Piping: One-piece cast brass with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece stamped steel or split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece cast brass with polished, chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece cast brass with polished, chrome-plated finish.
 - g. Bare Piping in Equipment Rooms: One-piece cast brass with polished, chrome-plated finish.
 - 2. Escutcheons for Existing Piping to Remain:
 - a. Insulated Piping: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - d. Bare Piping in Unfinished Service Spaces: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.
 - e. Bare Piping in Equipment Rooms: Split-plate, stamped steel with concealed hinge with polished, chrome-plated finish.

3.2 FIELD QUALITY CONTROL

- A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 230518

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Equipment supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-plated steel.

2.3 TRAPEZE PIPE HANGERS

- ### A.
- Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atkore International (Unistrut).
 - b. Eaton (B-line).
 - c. Flex-Strut Inc.
 - d. MIRO Industries.
2. Description: Shop- or field-fabricated, pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturred lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
8. Metallic Coating: Hot-dip galvanized.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Buckaroos, Inc.
 - 2. Carpenter & Paterson, Inc.
 - 3. National Pipe Hanger Corporation.
 - 4. Pipe Shields Inc.
 - 5. Piping Technology & Products, Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psi or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength and vapor barrier.
- C. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C 533, Type I calcium silicate with 100-psi or ASTM C 552, Type II cellular glass with 100-psi or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psi minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

- A. See architectural drawings and details for fastener systems into waffle slab.

2.7 MATERIALS

- A. Carbon Steel: ASTM A 1011/A 1011M.
- B. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; galvanized.
- C. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- F. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- I. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- J. Insulated Piping:

1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
2. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
3. Pipes NPS 8 and Larger: Include reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
4. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is unnecessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is unnecessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.

4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

END OF SECTION 230529\

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

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. Pipe labels.
 - 2. Duct labels.
 - 3. Valve tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Craftmark Pipe Markers.
 - 2. Seton Identification Products; a Brady Corporation company.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.2 DUCT LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Craftmark Pipe Markers.
 - 2. Seton Identification Products; a Brady Corporation company.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Black.
- D. Background Color: White.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- J. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.3 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Craftmark Pipe Markers.
 2. Seton Identification Products; a Brady Corporation company.
- B. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Fasteners: Brass wire-link chain or S-hook.
- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.

- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- C. Pipe Label Color Schedule:
 - 1. Heating Hot Water: Black letters on a safety-white background.

3.5 DUCT LABEL INSTALLATION

- A. Install plastic-laminated or self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For cold-air supply ducts.
 - 2. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.6 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:

- a. Heating Hot water supply and return: 1-1/2 inches, round.

3.7 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Balancing Air Systems:
 - a. Constant-volume air systems
 - b. Hydronic systems.
 - 2. Testing, Adjusting, and Balancing Equipment:
 - a. Exhaust Fans
 - b. Heat-transfer baseboard.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

- A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual

understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Needs for coordination and cooperation of trades and subcontractors.
 - d. Proposed procedures for documentation and communication flow.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.
- E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- F. Certified TAB reports.
- G. Sample report forms.
- H. Instrument calibration reports, to include the following:
 1. Instrument type and make.
 2. Serial number.
 3. Application.
 4. Dates of use.
 5. Dates of calibration.

1.6 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC.
 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
 2. TAB Technician: Employee of the TAB specialist and certified by AABC as a TAB technician.

- B. TAB Specialists Qualifications: Certified by NEBB.
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB.
 - 2. TAB Technician: Employee of the TAB specialist and certified by NEBB as a TAB technician.

- C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

1.7 FIELD CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- E. Examine test reports specified in individual system and equipment Sections.
- F. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- G. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- H. Examine operating safety interlocks and controls on HVAC equipment.

- I. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
 1. Equipment and systems to be tested.
 2. Strategies and step-by-step procedures for balancing the systems.
 3. Instrumentation to be used.
 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 1. Airside:
 - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
 - b. Duct systems are complete with terminals installed.
 - c. Volume, smoke, and fire dampers are open and functional.
 - d. Clean filters are installed.
 - e. Fans are operating, free of vibration, and rotating in correct direction.
 - f. Variable-frequency controllers' startup is complete and safeties are verified.
 - g. Automatic temperature-control systems are operational.
 - h. Windows and doors are installed.
 - i. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
 - 2. Measure fan static pressures as follows:

- a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
1. Measure airflow of submain and branch ducts.
 2. Adjust submain and branch duct volume dampers for specified airflow.
 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 2. Measure inlets and outlets airflow.
 3. Adjust each inlet and outlet for specified airflow.
 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
 2. Re-measure and confirm that total airflow is within design.
 3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
 4. Mark all final settings.
 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
 6. Measure and record all operating data.
 7. Record final fan-performance data.
- 3.6 PROCEDURES FOR MOTORS
- A. Motors 1 HP and Smaller: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.

3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

3.7 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.
 3. Hydronic supply and return: Plus or minus 10 percent.

3.8 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.

- c. Make and type.
- d. Model number and unit size.
- e. Manufacturer's serial number.
- f. Unit arrangement and class.
- g. Discharge arrangement.
- h. Sheave make, size in inches, and bore.
- i. Center-to-center dimensions of sheave and amount of adjustments in inches.
- j. Number, make, and size of belts.
- k. Number, type, and size of filters.

2. Motor Data:

- a. Motor make, and frame type and size.
- b. Horsepower and rpm.
- c. Volts, phase, and hertz.
- d. Full-load amperage and service factor.
- e. Sheave make, size in inches, and bore.
- f. Center-to-center dimensions of sheave and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

- a. Total airflow rate in cfm.
- b. Total system static pressure in inches wg.
- c. Fan rpm.
- d. Discharge static pressure in inches wg.
- e. Filter static-pressure differential in inches wg.
- f. Preheat-coil static-pressure differential in inches wg.
- g. Cooling-coil static-pressure differential in inches wg.
- h. Heating-coil static-pressure differential in inches wg.
- i. Outdoor airflow in cfm.
- j. Return airflow in cfm.
- k. Outdoor-air damper position.
- l. Return-air damper position.
- m. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

- a. System identification.
- b. Location.
- c. Coil type.
- d. Number of rows.
- e. Fin spacing in fins per inch o.c.
- f. Make and model number.
- g. Face area in sq. ft..
- h. Tube size in NPS.
- i. Tube and fin materials.
- j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - l. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.
 - n. Refrigerant suction temperature in deg F.
 - o. Inlet steam pressure in psig.

- G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Airflow rate in cfm.
 - i. Face area in sq. ft..
 - j. Minimum face velocity in fpm.

 2. Test Data (Indicated and Actual Values):
 - a. Heat output in Btu/h.
 - b. Airflow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.

- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.

- d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- J. Air-Terminal-Device Reports:
 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.

- e. Make.
- f. Number from system diagram.
- g. Type and model number.
- h. Size.
- i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Air velocity in fpm.
- c. Preliminary airflow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final airflow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.

K. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.10 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply and outdoor air.
 - 2. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Aeroflex USA.
 - b. Armacell LLC.
 - c. K-Flex USA.
- E. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.
- F. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- D. FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

2.3 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Fire- and water-resistant, flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 4. Color: Aluminum.

2.4 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.5 TAPES

- A. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Width: 3 inches.
 2. Thickness: 6.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.6 SECUREMENTS

- A. Insulation Pins and Hangers:
1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - b. Spindle: Aluminum or Stainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 4. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
 - 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 - 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

- b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

- b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.7 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.9 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 1. Indoor, concealed supply and outdoor air.
 2. Indoor, exposed supply and outdoor air.
 3. Indoor, concealed return.
 4. Indoor, exposed return.

5. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
6. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

3.10 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed or exposed supply-air, return-air, outdoor-air, and exhaust-air duct insulation shall a minimum of R-6 and shall be one of the following:
 1. Flexible Elastomeric: 2 inch thick.
 2. Mineral-Fiber Blanket: 2 inches thick and 1.5-lb/cu. ft. nominal density.
 3. Mineral-Fiber Board: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Heating hot water supply and return piping, indoors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Knauf Insulation.
 - c. Owens Corning.
 - 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 3. Type II, 1200 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- D. PVC Jacket Adhesive: Compatible with PVC jacket.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 - 4. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 - 2. Service Temperature Range: 0 to plus 180 deg F.
 - 3. Color: White.

2.6 SEALANTS

- A. ASJ Flashing Sealants, and PVC Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: White.

2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - 1. Width: 3 inches.
 - 2. Thickness: 11.5 mils.
 - 3. Adhesion: 90 ounces force/inch in width.
 - 4. Elongation: 2 percent.
 - 5. Tensile Strength: 40 lbf/inch in width.
 - 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.9 SECUREMENTS

- A. Bands:
 - 1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
- B. Wire: 0.062-inch soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.

2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.7 FIELD QUALITY CONTROL

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

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.9 INDOOR PIPING INSULATION SCHEDULE

- A. Heating Hot Water Supply and Return:
 - 1. NPS 1-1/4 and smaller: Insulation shall be one of the following:
 - a. Mineral-Fiber with ASJ, Preformed Pipe, Type I or II: 1-1/2 inches thick.
 - 2. NPS 1-1/2 and Larger: Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 2 inches thick.

END OF SECTION 230719

SECTION 232113 – HYDRONIC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe and Pipe Fittings For:
 - 1. Heating water piping system.
- B. Valves:
 - 1. Gate valves.
 - 2. Ball valves.
 - 3. Check valves.

1.2 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures.”
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide Manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welder's certification of compliance with ASME SEC 9 and AWS D1.1.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years' experience.
- B. Installer: Company specializing in performing the work of this Section with minimum 3 years' experience.
- C. Welders: Certify in accordance with ASME SEC 9 and AWS D1.1.
- D. Pressed Pipe Fittings: Submit documentation of fitting-manufacturer training of installers or their on-site supervisors, with names of individuals.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01 Section “Product Requirements.”
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GROUND

- A. Steel Pipe: ASTM A53, Schedule 40 for sizes less than 12 inch (300 mm), 0.375 inch (10 mm) wall for sizes 12 inch (300 mm) and over, black.
 - 1. Fittings: ASTM B16.3, malleable iron or ASTM A234, forged steel welding type fittings.
 - 2. Joints: Schedule 40 threaded for pipe sizes 2 inch (50.8 mm) and smaller, and AWS D1.1, welded for pipe sizes over 2 inch (50.8 mm).
- B. Copper Tubing: ASTM B88, Type L hard drawn.
 - 1. Allowed only for pipe sizes 2 inch (50.8 mm) and smaller.
 - 2. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 - 3. Joints: Solder or press fittings.

2.9 SOLDER MATERIALS:

- A. Manufacturers:
 - 1. Harris (Product: Stay-Brite).
 - 2. Lucas-Milhaupt (Product: Clean 'n Brite).
 - 3. Wolverine (Product: Silvabrite).
 - 4. No substitutions.
- B. Nominal Composition: Alloy of silver and tin (3-6 percent Ag, remainder Sn). Antimony-free.
- C. Physical Properties:
 - 1. Color: Bright Silver
 - 2. Solidus: 430 degrees F (221 degrees C)
 - 3. Liquidus: 430 degrees F (221 degrees C)

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- 4. Electrical Conductivity: 16.4 percent IACS
 - 5. Shear Strength: 10,600 psi (73 MPa)
 - 6. Tensile Strength: 14,000 psi (96 MPa)
 - 7. Elongation: 48 percent
- D. Specification Compliance:
- 1. NSF 51
 - 2. ASTM B32-89, Alloy Grade Sn96
 - 3. Federal Spec. QQ-S-571E, Class Sn 96 with exception to QPL paragraph 3.1
 - 4. J-STD-006, Sn96Ag04A
- E. Flux:
- 1. Harris (Product: Stay Clean Paste Flux, Stay Clean Liquid Flux (used with 4 inch or larger copper tubing also stainless steels), or Bridgit Water Soluble Paste Flux).
 - 2. Canfield (Product: Aqua-Brite or AB Cream Flux). Glycerin-based, water soluble.

2.10 UNIONS, FLANGES, AND COUPLINGS

- A. Unions for Pipe 2 inch (50 mm) and Under:
- 1. Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
 - 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe Over 2 Inch (50 mm):
- 1. Ferrous Piping: 150 psig (1034 kPa) forged steel, slip-on.
 - 2. Copper Piping: Bronze.
 - 3. Polypropylene Pipe:
 - a. Manufacturer: Aquatherm, Greenpipe product line, no substitutions.
 - 3. Gaskets: 1/16 inch (1.6 mm) thick preformed neoprene or EPDM, reinforced as required for the system operating pressure, up to relief valve setting.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.11 PRESS FITTING PIPING SYSTEMS

- A. Approved Manufacturers:
 - 1. Viega LLC, Wichita, KS - ProPress System with Smart Connect feature.
 - 3. Or approved equal.

- B. Fitting and Valve Products:
 - 1. Wrought copper and cast copper alloy (brass or bronze) fittings and valves for copper piping.
 - 3. Adapter fittings for transition connections to threaded fittings and dissimilar materials.
 - 4. Available sizes: 1/2 inch to 4 inch (12.7 mm to 101 mm).

- a) Features:
 - 1. Seals: O-ring type, factory installed in a fitting bead. Seals in larger sizes shall include a separator ring and a stainless steel grip ring.
 - 2. Seal Materials: EPDM (color shiny black) in copper for hydronic, potable water, and drain systems.
 - 3. Colored Identification Dots:
 - a. Copper Fittings:
 - 1) Green for EPDM seal.
 - 4. Smart Connect feature provides a leakage path to allow water and air to leak past any unpressed connection, for quick identification during pressure testing.

- b) Temperature/Pressure ratings (with appropriate type seals):
 - 1. Hydronic Systems: 0 to 250 degrees F (-17 to 121 degrees C) up to 200 psig (1723 kPa), at up to 100 percent maximum concentration of ethylene or propylene glycol. In solar systems, the FKM seal is suitable for temperature spikes up to 320 degrees F (160 degrees C).

- c) Accessories:
 - 1. Pressing: Use pressing tools, actuator jaws, and pressing rings, Ridgid brand manufactured by Ridge Tool Company, as recommended by the fitting manufacturer for each type of fitting.
 - 2. Lubricants: Do not use. Not recommended by fitting manufacturer.
 - 3. Cutting Tools: For copper, use wheeled cutting tool, or cutting tool approved by the fitting manufacturer. Use deburring tool or reamer after cutting.

2.12 PIPE HANGERS AND SUPPORTS

- A. See Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

2.13 SLEEVES

- A. See Division 23 Section "Sleeves and Escutcheons for HVAC Piping."

2.14 VALVES

A. Manufacturers:

1. Nibco.
2. Anvil International - Gruvlok product line
3. Apollo.
4. Crane
5. Hammond.
6. Milwaukee.
7. Veriflo division of Parker Hannifin Corp. – PVC and CPVC plastic valves.
8. Victaulic Company.
9. Watts.
10. Wheatley.
11. No substitutions.

B. Gate Valves Over 2 inch (50 mm):

1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.
2. 150 lb CWP.,

D. Ball Valves:

1. Up To and Including 2 inch (50 mm):
 - a. Bronze two piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle, solder or threaded ends.
 - b. 150 lb CWP
2. Over 2 Inch (50 mm):

- a. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.
 - b. 150 lb CWP.
 3. Stem Extensions: Provide ball valves in insulated piping with stem extensions to allow for continuous thickness of field-installed insulation.
- C. Swing Check Valves:
1. Up To and Including 2 inch (50 mm): Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder or threaded ends.
 2. Over 2 inch (50 mm): Iron body, bronze trim, bronze or bronze faced rotating swing disc, renewable disc and seat, flanged ends.
- D. Spring Loaded Check Valves: Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Division 23 Section "HVAC Water Treatment."

3.2 INSTALLATION

- A. Install in accordance with Manufacturer's instructions.
- B. Install components furnished under other Section and Divisions of the Specifications. Such items may include but are not limited to: Sensors furnished under Division 23 Section "Instrumentation and Control for Mechanical Systems."
- C. Install heating water piping to ASME B31.9.
- D. Pipe used shall be new material, and threads on piping shall be full length and clean cut with inside edges reamed smooth to full inside bore.
- E. Minimum pipe size allowed for hydronic piping shall be 3/4 inch (19 mm). Piping less than 3/4 inch (19 mm) shall not be allowed for these piping systems.

- F. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- G. Install piping to conserve building space, and not interfere with use of space.
- H. Group piping whenever practical at common elevations.
- I. Erect piping to provide for the easy passage and noiseless circulation of water under working conditions.
- J. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level. Slope water piping 1 inch in 40 feet (1:480) and arrange to drain at low points. Slope piping up in direction of water flow.
- K. On closed systems, equip low points with 3/4 inch (19 mm) drain valves and hose nipples. Provide, at high points of mains, collecting chambers and high capacity float operated automatic air vents, with ball valves on their inlets to valve off after initial system startup. Provide, at high points of branches, manual air vents with air chambers.
- L. Use main sized saddle type branch connections for directly connecting branch lines to mains in steel piping if main is at least 1 pipe size larger than the branch for up to 6 inch (152 mm) mains and if main is at least 2 pipe sizes larger than branch for 8 inch (203 mm) and larger mains. Do not project branch pipes inside the main pipe.
- M. Caulking of threads will not be allowed on any piping.
- N. Pipe joint compound shall be put on male threads only.
- O. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- P. Dissimilar Metals: Use non-conducting dielectric connections whenever jointing dissimilar metals. Cast red-brass (not yellow brass) or bronze-bodied fittings such as valves and couplings may be used when joining steel to copper, steel to stainless steel, or copper to stainless steel. Steel and stainless steel may connect directly to iron, but copper may not connect directly to iron.
- Q. Where welded joints are required, steel piping shall be installed by the use of the oxyacetylene or electric welding process, except immediate connections to accessible equipment may be threaded. Piping shall have butt welds with welding fittings, standard factory fabricated tees, elbows, reducers, caps, and accessories. Branch outlets 2 inch (50.8 mm) and smaller shall be made by the use of approved welding type half-couplings, “Weldolet” or “Threadolet” fittings.
 - 1. Piping smaller than 2 inch (50.8 mm) may be installed at the Contractor’s option with welding type, or threaded type fittings, except that piping regardless of size concealed in trenches or inaccessible building construction (for example, concealed behind sheetrock walls or concealed above sheetrock ceilings) shall be welded.

2. Offsets shall be installed with long radius welding elbows.
 3. Welding shall be executed only by certified welding mechanics in accordance with the best practice of the trade.
- R. Sleeve pipe passing through partitions, walls and floors:
1. See Division 23 Section "Sleeves and Escutcheons for HVAC Piping."
 2. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.
 3. Extend sleeves through floors as follows: In locations not otherwise indicated, 2 in. (50 mm) above finished floor level. In normally-dry locations such as finished office spaces under fin tube and baseboard radiation, 1 in. (25 mm) above finished floor level. Finished floor level includes the thickness of floor finish materials such as carpet and tile. Caulk sleeves full depth and provide floor plate.
 4. Where piping passes through floor, ceiling or wall, close off space between pipe sleeve and construction with non-combustible insulation or with approved firestopping material when penetrating fire rated floors, ceilings or walls. Provide tight fitting metal escutcheons on both ends of sleeves to prevent movement of sleeve during piping expansion. Escutcheons shall be sized slightly larger than outside diameter of piping and smaller than diameter of sleeve. Escutcheons shall be rigidly secured to walls.
 5. Where piping passes through fire rated floors, ceilings or walls, close off space between pipe insulation and sleeve with approved firestopping material
 6. Install chrome-plated escutcheons where piping passes through finished surfaces.
- S. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Division 23 Section "HVAC Piping Insulation."
- T. In the erection of mains, use special care in the support, working into place without springing or forcing, and proper allowance made for expansion.
- U. Pipes shall be anchored, guided, and otherwise supported, where necessary, to prevent vibration or to control expansion.
- V. Make such offsets as are shown and required to place the pipes and risers in proper position to avoid other work.
- W. Take branch lines off bottom of mains or at 45 degree bottom angle, as space permits.
- X. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves,

equipment or other apparatus.

- Y. Install a sufficient number of unions or flanged fittings to facilitate making possible future alterations or repairs.
- Z. Install concealed pipes close to building structure to keep furring to a minimum.
- AA. Provide access where valves and fittings are not exposed.
- BB. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- CC. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Division 09 Section "Painting."

3.3 VALVES

A. Valve Type Selection:

1. Use gate, ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
 2. Use Bronze Ball Valves for general shut-off service in heating and cooling system piping 2 inch (50.8 mm) and smaller and at heating terminal units 2 inch (50.8 mm) and smaller, including fin-tube radiation, unit heaters, convectors and fan coil units.
 3. Use Bronze Ball Valves for drain valves with hose connections. Provide valve of size indicated; if size isn't indicated, provide at least 3/4 inch (19 mm) valve size. Provide outlet fitting for standard "garden hose" with 3/4 inch (19 mm) hose threads. Provide brass cap with retainer chain. Compression-type "boiler drain valves" are not allowed.
- B. With the exception of valves which must be properly sized to ensure design flow rates (such as balancing valves), valves shall be line sized.
 - C. For isolation valves, control valves and balancing valves located above suspended ceilings and in areas that are not visible to building occupants (for example, mechanical rooms), provide yellow colored surveyors tape. Permanently attach tape to valve handles and run tape down to 10 inches (254 mm) above ceiling or 12 inches (305 mm) below valve handle where ceilings do not exist (for example, mechanical rooms).
 - D. Install valves with stems upright or horizontal, not inverted.

3.4 CLEANING

- A. After satisfactory completion of pressure tests, before permanently connecting equipment, strainers, and the like, clean equipment thoroughly, blow and flush piping for a sufficient length of time as directed, so that interiors will be free of foreign matter. Perform cleaning in the presence of an authorized representative of the Architect.

Provide a minimum of 10 days notification to the Architect prior to system cleaning.

- B. Fill, vent and circulate the system with approved solution in accordance with equipment (boiler, piping, coils, and others) manufacturer’s recommendation, allowing it to reach design or operating temperatures. After circulating for 6 hours, drain the system completely and remove and clean strainer screens. Perform cleaning in the presence of an authorized representative of the Architect. Provide a minimum of 10 days notification to the Architect prior to system cleaning.
- C. Fill and vent system as required.
- D. Manually vent heat transfer units and high points of the system.
- E. After system has been completely filled, start zone pumps and circulate cold water for a short time to dislodge small air bubbles, and return them to air extraction device.
- F. Raise water temperature to 200 degrees F (93 degrees C) while operating pumps.
- G. Stop pump and vent radiation and high points of the system. Normal operation may now be started at any time.

3.5 TESTING

- A. No joint or section of piping shall be left untested.
- B. Before testing piping systems, remove, or otherwise protect from damage, control devices, air vents, and other parts which are not designed to stand test pressures.
- C. Test piping for leaks under 100 psig (689 kPa) air pressure with soap suds prior to hydrostatic testing.
- D. Test piping hydrostatically to 1-1/2 times the maximum systems operating pressure, but in no case to less than 75 psig (517 kPa), for at least 4 consecutive hours, during which time pressure shall remain constant without pumping.
- E. Test and obtain Architect’s approval before painting, covering, or concealing piping, including swing joints.

END OF SECTION 232113

SECTION 233113 - METAL DUCTS

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. Single-wall rectangular ducts and fittings.
2. Single-wall round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

- B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" ASCE/SEI 7.
- C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.4 ACTION SUBMITTALS

- A. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct

Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.4 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Water-Based Joint and Seam Sealant:
1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.

4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 8. Service: Indoor or outdoor.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- C. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
 2. Type: S.
 3. Grade: NS.
 4. Class: 25.
 5. Use: O.
- D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- E. Round Duct Joint O-Ring Seals:
1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- F. Trapeze and Riser Supports:
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

- C. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- D. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: See Architectural drawings and specifications for attachment to the building waffle slab.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

B. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

C. Duct system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel

B. Supply, Return, Outdoor air and Exhaust Ducts:

1. Ducts Connected to Constant-Volume Air-Handling Units:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
2. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive 2-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

END OF SECTION 233113

SECTION 233300 - AIR DUCT 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. Manual volume dampers.
 - 2. Flexible connectors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
1. Standard leakage rating, with linkage outside airstream.
 2. Suitable for horizontal or vertical applications.
 3. Frames:
 - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 4. Blades:
 - a. Multiple blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 5. Blade Axles: Galvanized steel.
 6. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 7. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
1. Size: 0.5-inch diameter.
 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:
1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.

2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 1. Minimum Weight: 26 oz./sq. yd..
 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 3. Service Temperature: Minus 40 to plus 200 deg F.

2.5 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Compliance with ASHRAE/IESNA 90.1-2004 includes Section 6.4.3.3.3 - "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct

- liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install flexible connectors to connect ducts to equipment.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233713.13 - AIR DIFFUSERS

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. Rectangular and square ceiling diffusers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Nailor Industries Inc.
 - 2. Price Industries.
 - 3. Titus, a division of Air System Components; Johnson Controls, Inc.
 - 4. Tuttle & Bailey, a division of Air System Components; Johnson Controls, Inc.
- B. Material: Aluminum.
- C. Finish: Baked enamel, white.
- D. Face Size: 20 by 20 inches.

2.2 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers are installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Include GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS and applicable parts of Division 01 as part of this Section.
- B. The GENERAL REQUIREMENTS, DIVISION 01, and BIDDING AND CONTRACT REQUIREMENTS, DIVISION 01, are hereby made a part of this Specification Section.
- C. Examine all Drawings and all Sections of the Specifications for requirements therein affecting the work and this Section. The exact scope of work of this bidder cannot be determined without a thorough review of all specification sections and other contract documents.

1.2 SCOPE OF WORK

- A. As used in this Section, "provide" means "furnish and install" and "HVAC" means "Heating, Ventilating and Air Conditioning" and "POS" means "Provided Under Other Sections". "Furnish" means "to purchase and deliver to the project site complete with every necessary appurtenance and support," and "Install" means "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."
- B. Perform work and provide material and equipment as shown on Drawings and as specified or indicated in this Section of the Specifications. Completely coordinate work of this Section with work of other trades and provide a complete and fully functional installation. Drawings and Specifications form complimentary requirements; provide work specified and not shown, and work shown and not specified as though explicitly required by both. Although work is not specifically shown or specified, provide supplementary or miscellaneous items, appurtenances, devices and materials obviously necessary for a sound, secure and complete installation. Remove all debris caused by contractors' work.
- C. Drawings are diagrammatic and indicate general arrangement of systems and work included in Contract. It is not intended to specify or to show every offset, fitting or component; however, Contract Documents require components and materials whether or not indicated or specified as necessary to make the installation complete and operational.

- D. Perform work strictly as required by rules, regulations, standards, codes, ordinances, and laws of local, state, and federal government, and other authorities that have lawful jurisdiction.
- E. Give notices, file plans, obtain permits and licenses, pay fees and obtain necessary approvals from authorities that have jurisdiction.
- F. As work progresses and for duration of Contract, maintain complete and separate set of prints of Contract Drawings at job site at all times. Record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design.
- G. Work shall include, but shall not be limited to, the following:
 - 1. Lighting Controls shall consist of wall or ceiling occupancy sensors and single pole switches.
 - 2. Panelboard circuit breakers.
 - 3. LED Lighting fixtures.
 - 4. Conduit and raceways.
 - 5. Wire and cable.
 - 6. Branch circuit wiring.
 - 7. Wiring devices and plates.
 - 8. Fire seal and fire-proof foam.
 - 9. Sleeving.
 - 10. All cores required for electrical equipment and conduit shall be provided by the electrical contractor.
 - 11. Staging, scaffolding, ladders, chutes and other construction aids as required for all electrical work.
 - 12. Pull boxes and cable troughs.
 - 13. Grounding.
 - 14. Addressable fire alarm system devices
 - 15. Supervision and approval.

16. Electrical connections to HVAC and other equipment provided under other Sections or by Owner.
17. Nameplates, labels and tags.
18. Testing.
19. Coordination drawings and shop drawings.

1.3 CONTRACT DOCUMENTS

- A. Work to be performed under this Section is shown primarily on the Electrical Drawings.
- B. Electrical Contractor shall refer to Architectural, HVAC, Electrical and other Drawings and other Sections that indicate types of construction in which work shall be installed and work of other trades with which work of this Section must be coordinated.
- C. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.
- D. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.
- E. Drawings are diagrammatic. They are not intended to be absolutely precise; they are not intended to specify or to show every offset, fitting, and component. The purpose of the drawings is to indicate a systems concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational.
- F. Information and components shown on riser diagrams, but not shown on plans, and vice versa, shall apply or be provided as if expressly required on both.

1.4 DISCREPANCIES IN DOCUMENTS

- A. Address questions regarding drawings to Architect in writing before award of contract; otherwise, Architect's interpretation of meaning and intent of drawings shall be final.
- B. The EC shall own the larger quantity of lighting fixtures, if there is a discrepancy between the electrical drawings and the RCP's.

1.5 SITE VISIT

- A. Before submitting bid, visit and carefully examine site to identify existing conditions and difficulties that will affect work of this Section. No extra payment will be allowed for additional work caused by unfamiliarity with site conditions that are visible or readily construed by experienced observer.

1.6 CODES, STANDARDS, AUTHORITIES AND PERMITS

- A. Perform work in strict accordance with the rules, regulations, standards, codes, ordinances, and laws of local, state and federal governments and other authorities having legal jurisdiction over the site.
- B. Underwriters' Laboratories (UL) shall list material and equipment.
- C. Give notices, file plans, obtain permits and licenses, pay fees and obtain necessary approvals from authorities that have jurisdiction. There are no anticipated utility backcharges for this project.

1.7 GUARANTEE AND 24 HOUR SERVICE

- A. Guarantee work in writing for one year from date of final acceptance. Repair or replace defective materials or installation at no cost to Owner. Correct damage caused in making necessary repairs and replacements under guarantee at no cost to Owner.
- B. Submit guarantee to Architect before final payment.
- C. Statement of guarantee requirements shall not be interpreted to limit Owner's rights under law and this contract.

1.8 RECORD DRAWINGS

- A. Maintain record drawings on site. Record set must be complete and current and available for inspection when requisitions for payment are submitted.

1.9 SUBMITTALS

- A. Refer to Specifications Section 01 00 00 Submittal Procedures. Submit shop drawings and product data within 30 days after award of contract. Check, stamp and mark with project name submittals before transmitting to Architect. Indicate deviations from contract documents.
- B. Deviations from contract documents or proposed substitution of materials or equipment for those specified shall be requested in separate letter whether deviations are due to field conditions, standard shop practice, or other cause.
- C. Within four weeks (except as noted otherwise) after award of contract and before ordering materials or equipment. Submit list of proposed materials and equipment and indicate manufacturer's names, addresses and identifying data. No consideration will be given to partial lists submitted out of sequence.

- D. Substitutions for scheduled lighting equipment will be rejected unless substitution submittal is received within ten days of contract award.
- E. Schedule at least ten working days, exclusive of transmittal time for submittal review.
- F. Material and equipment requiring Shop Drawing and Product Data submittal shall include but shall not be limited to:
 - 1. Lighting control ceiling and wall mounted occupancy sensors
 - 2. Panelboard circuit breakers.
 - 3. LED Lighting fixtures
 - 4. Conduit and raceways.
 - 5. Wire and cable.
 - 6. Branch circuit wiring.
 - 7. Wiring devices and plates.
 - 8. Fire Alarm Devices

1.10 CUTTING AND PATCHING

- A. All cutting and patching one (1) square foot and less in area necessary for the proper installation of work to be performed under this Section and subsections shall be performed by the Electrical Contractor. All cutting and patching associated with demolition work and greater than one (1) square foot in area for the installation of work under this section shall be by the General Contractor.
- B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.
- C. All such chases, openings, and sleeves shall be located accurately of the proper size and shape and shall consult with the Engineer in reference to this work. In so doing, confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Engineer.
- D. Carefully fit around, close up, repair, patch, and point around the work specified herein to the entire satisfaction of the Engineer.
- E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment by himself, his contractors or other filed contractors.

- F. All of this work shall be carefully done by workmen competent to do such work and with the proper and smallest tools applicable.
- G. Any cost caused by defective or ill-timed work shall be the respective contractor's responsibility therefore.
- H. The fire resistance rating of floors walls and ceilings shall be maintained. UL listed firestopping shall be installed in accordance with manufacturer's written instructions.

1.11 COORDINATION DRAWINGS

- A. General: General Contractor shall prepare and provide one accurately scaled set of building "base sheets" in CAD format for production of Coordination Drawings. The Coordination Drawings shall at not less than 1/4 inch for Mechanical and Electrical spaces and at 1/8 inch for all other areas. General Contractor shall establish CAD layer standards for each trade and shall be responsible for distribution to each trade. The sequence of Coordination Drawings shall be Contractor-Structural-HVAC-Electrical-Plumbing-Fire Protection-Contractor. Upon review and approval of coordination drawings, the General Contractor shall provide a complete set to the owner on 4 mil reproducible mylar and electronic files in CAD format.
- B. The Electrical contractor, the HVAC contractor shall coordinate all Electrical, HVAC work with that of each trade, in order to:
 - 1. Avoid interferences between general construction, mechanical, electrical, structural and other specialty trades.
 - 2. Maintain clearances and advise other trades of clearance requirements for operation, repair, removal and testing of mechanical equipment.
 - 3. Indicate aisleways and accessways required on coordinated shop drawings for mechanical equipment rooms, electrical rooms, computer rooms, and kitchens.
 - 4. Coordinate location of sleeves and inserts, including setting in place prior to pouring concrete.
- C. Electrical Coordination Drawings
 - 1. The Electrical Contractor shall prepare Coordination Drawings showing all work to be installed as part of Section 26 00 00.
 - 2. The Electrical Contractor, after showing all of the Electrical work, shall forward the reproducible coordination drawings to the General Contractor.
 - 3. The Electrical Contractor shall attend a series of meetings arranged by the Contractor to resolve any real or apparent interferences or conflicts

with the work of the other contractors or with ceiling heights shown on the drawings.

4. The Electrical Contractor shall then make adjustments to his work on the Coordination Drawings to resolve any real or apparent interferences or conflicts and forward to the Contractor.
5. After any real or apparent interferences and conflicts have been incorporated into the Coordination Drawings, the Contractor shall prepare the final Coordination Drawings and submit to the Architect.
6. The Electrical Contractor shall not install any of his work prior to the preparation of the final Coordination Drawings. If Electrical work proceeds prior to the final Coordination Drawings, any change to the Electrical work to correct the interferences and conflicts which result will be made by the Electrical Contractor at no additional cost to the Owner.
7. Coordination Drawings are for the Electrical Contractor's and Architect's use during construction and shall not be construed as replacing any shop, "as-built", or Record Drawings required elsewhere in these Contract Documents.
8. Review of Coordination Drawings shall not relieve the Electrical Contractor from his overall responsibility for coordination of all work performed pursuant to the Contract or from any other requirements of the Contract.

1.12 FINAL ACCEPTANCE

- A. Final acceptance of Ownership of the Electrical system installed within this scope of work shall be contingent on passing a satisfactory grounding test, mechanical test and performance lighting test, to determine that the system will perform according to the contract requirements. The above tests shall be witnessed by the Engineer and the Owner at his option and acceptance will only be granted in writing by the Owner after receipt of certification from the Engineer that the design criteria have been met.
- B. The work shall be so performed that the progress of the entire building construction, including all other trades, shall not be delayed or interfered with. Materials and apparatus shall be installed as fast as conditions permit and must be installed promptly when and as desired.
- C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Engineer for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Engineer's satisfaction, at no expense to the Owner.

- D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section will interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. If so directed, prepare and submit for approval 3/8 inch scale or larger working drawings and sections, clearly showing how this work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

1.13 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The work shall be so performed that the progress of the entire building construction including all other trades shall not be delayed nor interfered with. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as desired.
- B. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Architect for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Architect's satisfaction, at no expense to the Owner.
- C. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section will interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8 inch scale or larger working drawings and sections, clearly showing how this work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.
- D. Keep fully informed as to the shape, size and position of all openings required for all apparatus and give information in advance to build openings into the work. Furnish and set in place all sleeves, pockets, supports and incidentals.
- E. All distribution systems which require pitch or slope such as storm and sanitary drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, lights and apparatus and install work to avoid interferences.
- F. This contractor shall, with the approval of the Architect and without extra charge, make reasonable modifications in his work as required by normal structural interferences, or by interference with work of other trades, or for proper execution of the work.

- G. This contractor shall protect all materials and work of other trades from damage that may be caused by his work and shall make good any damages so caused.
- H. This contractor shall submit Requests for Information (RFI's) regarding the work of this section in accordance with the provisions of Division 01.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Rigid metallic conduit shall be zinc-coated steel that conforms to industry standards, by Allied Tube and Conduit, Republic Steel, Wheatland Tube or approved equal.
- B. Intermediate metal conduit (IMC) shall be zinc-coated steel that conforms to industry standards, by Allied tube and Conduit, Triangle/PWC or approved equal.
- C. Electrical metallic tubing (EMT) shall be zinc-coated steel that conforms to industry standards, by Republic Steel, Allied Tube and Conduit, Triangle/PWC or approved equal.
- D. Wireways shall be sheet steel with hinged spring-latched covers, galvanized or painted to protect against corrosion. Provide necessary bends, couplings, connectors and other appurtenances. Interior parts shall be smooth and free of sharp edges and burrs. Wireways shall be by Square D or approved equal.
- E. Non-metallic conduit shall be Schedule 40 100% virgin polyvinyl chloride (PVC), 90° C UL-rated, by Carlon or approved equal. EC shall provide schedule 80 as indicated on drawings and for all exterior direct buried conduit. Direct buried conduit shall be packed in a minimum of 2" of sand.
 - 1. Conduit shall meet NEMA requirements and shall be UL-listed as required by Article 347 of NEC.
 - 2. Conduit, fittings and solvent cement shall be by single approved manufacturer.
 - 3. Material shall have minimum tensile strength of 7,000 psi at 73.4° F, minimum flexural strength of 11,000 psi, and minimum compressive strength of 8,600 psi.
- F. Flexible metallic conduit shall be galvanized, spiral wrapped metallic conduit (Greenfield) or liquid-tight flexible metallic conduit as specified for specific equipment.
- G. Conduit expansion fittings shall be threaded hot-dipped galvanized malleable iron with internal bonding assembly by O.Z./Gedney or approved equal.

- H. Conduit fire seat fittings shall have heat-activated intumescent material for fire rating equal to or higher than that of floor or wall by O.Z./Gedney or approved equal.
- I. Provide water-tight gland sealing assemblies with pressure bushings as required for penetrations.
- J. Provide threaded malleable iron or steel connectors and couplings with insulated throats; manufactured elbows; locknuts; and plastic or bakelite bushings at terminations, as necessary. Couplings and connectors shall be gland and ring compression or stainless steel multiple point locking or steel concrete-tight set screw. Compression couplings and connectors shall form positive ground. Set-screw connectors and couplings shall have wall thickness equal to conduit, case-hardened, hex-head screws and separate ground wire. Bushings for rigid steel conduit and connectors for EMT shall have insulating inserts that meet requirements of UL 514 flame test.

2.2 OUTLET BOXES

- A. Outlet boxes on concealed work shall be at least 4" square or octagonal, galvanized pressed steel with plaster rings as required. Outlet boxes for exposed conduit work shall be cast aluminum alloy with cast aluminum alloy covers.
- B. Where installed in plaster, boxes shall be fitted with galvanized steel plaster covers of required depth to finish flush with finished wall or ceiling.
- C. Switch boxes, receptacle boxes and other outlet boxes shall be standard 4" square with plaster rings or gang covers as required.
- D. Outlet boxes shall be by Steel City Electric Company, Appleton Electric Company, National Electric Products Company or approved equal.
- E. Outlet boxes for various systems and components shall be as required by manufacturer.
- F. All receptacle back boxes shall be provided with acoustical gaskets.
- G. Waterproof boxes shall be Condulet Cast Boxes with water-proof devices and covers. Provide hot-dipped galvanized corrosion-resistant epoxy enamel finish or PVC-coated products, where noted on Drawings.
- H. Provide screw-joint outlet boxes, with gasketed weatherproof covers in exterior locations, where exposed to moisture, next to water or steam connections, and where indicated as weatherproof on Drawings.
- I. Provide only enough conduit openings to accommodate conduits at individual location. Each box shall be large enough to accommodate number and sizes of

conduits, wires and splices to meet NEC requirements, but shall be at least size shown or specified. Necessary volume shall be obtained by using boxes of proper dimensions. Box depths greater than 2-1/8" shall not be used to obtain necessary volume, but may be used with Architect's approval to facilitate installation. Standard concrete boxes may be 6" deep where necessary to permit entrance of conduits into sides of boxes without interference with reinforcing bars. Octagonal hung ceiling boxes with suspension bars may be 3-1/2" deep. Rectangular boxes for inter-connection of branch circuit conduits may be 2-1/2" deep.

2.3 JUNCTION BOXES, PULL BOXES AND CABLE TROUGHS

- A. Provide code gauge galvanized steel junction and pull boxes for conduit 1-1/4" trade size and larger, where indicated and as necessary to facilitate installation, of required dimensions, with accessible, removable screw-on covers. Provide junction and pull boxes in special sizes and shapes determined in field where necessary.
- B. Junction box covers shall be accessible. Do not install junction boxes above suspended ceilings except where ceiling is removable or where access panel is provided.
 - 1. Sheet metal pull boxes shall be supported adequately to maintain shape. Larger boxes shall have structural steel bracing welded into rigid assembly formed adequately to maintain alignment in shipment and installation. Secure covers with corrosion-resistant screws or bolts.
 - 2. Pull boxes exposed to rain or in wet locations shall be weatherproof.
 - 3. Pull boxes used with aluminum conduit shall be metal compatible with aluminum.
 - 4. Provide clamps, grids and other appurtenances to secure cables. No cable shall be unsupported for more than 30".
 - 5. No pull box shall be within 2 feet of another.
 - 6. Provided sealed, cast-alloy, hazardous-location boxes with sealing fittings in garages and other areas in which flammable gases or vapors may be present to prevent transmission of gases or vapors through conduits.
 - 7. Pull boxes connected to concealed conduits shall be mounted with covers flush with finished wall or ceiling. No aluminum pull box shall be embedded in concrete.
- C. Provide cable troughs of special shapes, design and construction required to install, support and enclose feeder cable throughout indicated routing. Troughs shall be as specified above for junction and pull boxes, with reinforcing,

insulating supports and clamping for cable installation. Cables shall be continuous throughout troughs, and shall be racked in distributed phase groupings arranged with phase cables surrounding neutral conductors.

2.4 WIRE AND CABLE (600 V INSULATION)

- A. Provide single-conductor, annealed copper wire and cable with insulation rated 600 V, of sizes specified and scheduled on Drawings, by General Electric, Rome, Okonite or approved equal, for secondary service, feeders, branch and system wiring. Wire insulated for 300 V may be used where voltage is less than 100 V, if isolated from higher voltages. Wire sizes shown and specified are American Wire Gauge for copper.
- B. Armored cable shall be Type AC 600 V copper with full-sized insulated ground conductor. Hospital-grade armored cable shall be provided in all Semi-private Inpatient, Private Inpatient, Shared Clinic, Exam and Treatment Rooms. Use if restricted by requirements of Paragraph entitled WIRING METHODS in Part 3 of this Section. Minimum size shall be #12 AWG unless specified otherwise.
- C. Wire #8 and larger shall be stranded; #10 and smaller shall be solid. Wire and cable shall have THWN-THHN or XHHW insulation.
- D. Motor control circuits and signal wiring may be #14 if NEC requirements are met. Branch circuits longer than 75' for 120 V shall be at least #10 from panel to last outlet.
- E. Wiring within light fixtures and other high-temperature equipment shall have 150°C insulation as required by NEC.
- F. Cable for direct burial is not allowed.
- G. Splices and Terminations
 - 1. Make splices in branch circuit wiring with UL-listed, solderless connectors rated 600 V, of sizes and types required by manufacturer's recommendations with temperature ratings equal to those of wires. Splice connectors shall be screw-on. Insulate splices with integral covers or with plastic or rubber friction tape to preserve characteristics of wire and cable insulation.
 - 2. Provide standard bolt-on lugs with hex screws to attach copper wire and cable to panelboards, switchboards, disconnect switches and electrical equipment.
 - 3. Make terminations and splices for conductors #6 and larger with corrosion-resistant, high-conductivity pressure indent, hex screw or bolt-clamp connectors, with or without tongues, designed specifically for intended service. Connectors for cables 250 MCM and larger shall have

two clamping elements or compression indents. Terminals for bus connections shall have two bolt holes.

4. Ampacity of splices and connectors shall be equal to those of associated wires and cables.

H. Arc-proofing

1. Provide flexible, flame-retardant, organic-composition-coated elastomer arc-proofing tape on power cable in manholes and handholes, suitable to withstand 200 A arc for 30 seconds. Tape shall be self-extinguishing and shall not support combustion.
 2. Apply tape in single, half-lapped layer as required by manufacturer's recommendations. Secure with strips of red plastic film tape on 208Y/120V conductors.
- I. Provide three-ply marlin twine lacing or self-extinguishing nylon straps with -65 to 350° F range for bundling conductors.

2.5 FEEDER IDENTIFICATION

- A. Provide nonferrous identifying tags or pressure-sensitive labels for cables, feeders, and power circuits in pull boxes and electrical rooms, at cable terminations and in other locations.
- B. Tags or labels shall be stamped or printed to correspond with markings on Drawings or marked so that feeder or cable may be identified readily. If suspended tags are provided, attach with 1/32" diameter nylon 55-pound test monofilament line or slip-free plastic cable lacing unit.

2.6 COLOR CODING

- A. Color code secondary service, feeders and branch circuit conductors as follows:

<u>208/120 Volts</u>	<u>Phase</u>
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

- B. Colors shall be factory-applied entire length of conductors by one of the following methods except as noted and limited below:
 - 1. solid color compound,
 - 2. solid color coating,
 - 3. colored stripping (2 stripes 180 degrees apart),
 - 4. colored bands or hash marks with maximum spacing of 18",
 - 5. colored fibrous covering, or
 - 6. surface printing every 12", maximum spacing of 18".
- C. Branch circuit conductors #12 and #10 shall have solid color compound, solid color coating. Neutrals and equipment grounds shall have solid compound or solid color coating (white, gray and green), except that neutrals with colored stripe shall be used where required by NEC. Conductor's #8 and larger with stripes, bands or hash marks shall have background color other than white, green and gray.
- D. Solid color coating, stripes, bands or hash marks shall be strongly adherent paint or dye, sufficiently wide and clear to be readily distinguishable after installation.
- E. Alternative field-applied color coding methods may be used for wire #10 or larger, with color code specified in Subparagraph A:
 - 1. Apply 3/4" colored pressure-sensitive plastic tape in half overlapping turns for 6" from all terminal points and in boxes in which splices or taps are made. Apply last two laps of tape with no tension. Do not cover cable identification markings.
 - 2. Identify with nylon, self-extinguishing, self-locking colored cable ties. Ties shall accommodate wire sizes 1/16" through 1-3/4" in diameter and shall not be less than 0.18" wide. Minimum tensile strength shall be at least 50 lbs. Temperature range shall be -65° F to +350° F. Provide three ties to each wire at each terminal point starting 3" from terminal and spaced 3" apart and three ties to each wire in boxes where splices or taps are made with special tool or pliers, and cut off excess.

2.7 WIRE PULLING EQUIPMENT

- A. Provide polyethylene ropes for pulling wire.
- B. Provide fish wires in telephone conduits and other empty conduit systems required, without splices and with ample exposed lengths at each end.

- C. Provide wire pulling lubricants that meet applicable UL requirements as necessary.

2.8 CABLE SUPPORTS AND BOXES

- A. Provide cable supports and boxes for vertical feeders as required by NEC. Boxes shall be 10 gauge steel plates fastened to angle iron frame with removable covers secured with brass machine screws.
- B. Provide split wedge cable supports with clamps for cable without metallic sheath. Provide basket weave or approved equal cable supports approved by cable manufacturer for cable with metallic sheath. Supports shall be by O.Z./Gedney or approved equal.

2.9 WIRING DEVICES

- A. Provide wiring devices by single manufacturer. Pass and Seymour, Leviton, Bryant or Hubbell. Catalog designations of Pass and Seymour are specified to establish standards of quality for materials and performance. Devices shall be the color by architect.
- B. Toggle Switches:
 - 1. Single-pole shall be No. CSB20AC1, 20A, 120-277 V AC.
 - 2. Double-pole shall be No. CSB20AC2, 20A, 120-277 V AC.
 - 3. Three-way shall be No. CSB20AC3, 20A, 120-277 V AC.
 - 4. Four-way shall be No. CSB20AC4, 20A, 120-277 V AC.
- C. Receptacles:
 - 1. Single shall be No. 5361, 125 V, 20A, 2-pole, 3 W, grounding.
 - 2. Heavy duty receptacles shall be sized as required for intended service.
 - 3. Duplex shall be 5362, 125 V, 20A, 2-pole, 3 W, grounding.
 - 4. Tamper resistant shall be TR5362
 - 5. Weather resistant convenience Rec, 125 V, 20A, shall be WR5362
 - 6. GFCI receptacles shall be 2095.
- D. Receptacle back boxes shall be provided with acoustical gaskets.

2.10 WIRING DEVICE PLATES

- A. Provide stainless steel device plates by Pass & Seymour, Bryant or Hubbell. EC shall coordinate all switches, receptacles, data and phone devices as well as device plate covers with owner and architect. All devices and plate shall be the same color white unless directed otherwise by the architect.
- B. Nameplate designations for device plates shall be provided using P-Touch labeling system.
- C. Device plates shall be manufacturer of wiring devices.
- D. Receptacle device plates for circuits other than 120 V, 2-wire, shall be engraved with 1/4" letters, filled red, indicating voltage characteristics and circuit number of outlet.
- E. Outlets shall be flush to surface.

2.11 LED LIGHTING FIXTURES

- A. Provide lighting fixtures, equipment and components where shown on Drawings, as listed in fixture schedules and as specified, wired and assembled. Provide approved aligner canopies, hangers and other appurtenances as required.
- B. Verify ceiling constructions, and provide fixtures, ballasts, frames, rings and other accessories suitable for construction encountered.
- C. Coordinate installation of fixtures with installation of ceiling materials and suspension system.
 - 1. Ceiling-mounted fixtures shall be supported independent of hung ceiling with threaded rod or bow chain.
 - 2. In no case shall lighting fixtures be suspended from hung ceiling, conduit or duct. Fixtures shall be supported from structural members only.
 - 3. Provide unistrut below ducts from which to hang fixtures when fixture locations coincide with duct runs. Provide threaded rods to support unistrut.
 - 4. Investigate lighting fixture locations and supports to ensure that no interference exists between lighting fixture, supports and other equipment. Correct interferences as directed by Architect.

2.12 PANELBOARD CIRCUIT BREAKERS

- A. Provide molded case, bolt-on, thermal-magnetic trip, single, two or three pole branch circuit breakers as shown on Drawings. Multiple pole breakers shall be single handle, common-trip. All circuit breakers shall be rated for switching purposes.

- B. Provide typed panel directories that show use of each circuit and electrical characteristics of panelboard. Directory shall be mounted inside of each panel.

2.13 FIRE ALARM SYSTEM

A. Scope

1. Provide fire alarm devices as shown on the electrical construction fire alarm drawings. Existing system is a Fire-Lite MS-9200UDLS
2. General System Functionality:
 - a. All initiating and signal loops shall be class A style.
 - b. All initiating and signal loops out and return loops shall take different routes and be installed in different conduit.
3. Provide copies of Operating & Maintenance manuals with the request for final inspection. O & M Manuals shall include the following:
 - a. All of the information submitted in the shop drawings.
 - b. As-built documentation which incorporates all modifications to the system, whether made as a field change or by a change order.
 - c. Include a copy of the final test report, Record of Completion, and all test/support contract(s) as required by the Contract Documents.
4. Sequence of Operation
 - a. The operation of a manual station or activation of any automatic alarm initiating device (system smoke, system heat detector, water flow) shall initiate a system-wide response as follows:
 - 1) Initiate the transmission of the alarm to the Municipal Fire Department via auto dialer reporting.
 - 2) Sound a code 3 temporal evacuation signal throughout the building.
 - 3) Flash all visual signals throughout the building. Visual notification shall be synchronous in accordance with NFPA 72 guidelines.
 - 4) Flash an alarm LED and sound an audible signal at the FACP. Upon Acknowledgment, the alarm LED shall light steadily and the audible shall silence. Subsequent alarms shall re-initiate this sequence. These conditions shall remain until the condition is resolved and the system is reset.

- 5) Upon alarm initiation by an elevator lobby smoke detector or other designated recall device, recall all elevators that serve the floor of initialization to the main egress level. If the alarm initiates on the main egress level, return the elevator to the alternate floor as directed by the local authority having jurisdiction. Provide for shunt tripping over elevator power as shown and required by applicable codes.
- 6) Visually indicate the alarm initiating device type, status and location via the LCD display located at the FACP, on the Security Management System (SMS) operator's console, and at any remote system annunciators.
- 7) Automatically shut down affected Supply and Return fans, and control HVAC equipment to initiate smoke control functions as required. Manual override controls and programmable relay interface modules shall serve to integrate the Fire Alarm System to the Building Automation System.

B. General Requirements

1. All equipment shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials and accessories covered by these requirements shall be provided by a single manufacturer, or if provided by different manufacturers recognized as compatible by both manufacturers.
2. All control equipment must have transient protection devices to comply with UL 864 requirements.
 - a. Isolated Loop Circuit Protector (ILCP): Furnish and install an isolated loop circuit protection device on all fire alarm circuits which extend beyond the building by either aerial, underground or other methods (walkways, bridges or other above ground connectors).
 - b. The ILCP shall be located as close as practical to the point at which the circuits leave or enter the building. The grounding conductor shall be a No. 12 AWG wire having a maximum length of 28 feet and connected to a unified ground per the National Electric Code.
3. Circuiting Guidelines. Each initiating device and indicating circuit shall be electronically supervised and individually addressable. All wiring shall be as follows:
 - a. Addressable loop (signaling line circuit) wiring shall support all devices shown and allow for a minimum of 25% spare capacity, and be wired in a Class A, Style 6 fashion.

- b. Network Communications shall be wired in a Class A, Style 7 fashion.
 - c. Audio notification circuits shall be sized to accommodate all speakers shown to be set at 1 watt each, plus a minimum of 50% spare capacity. A minimum of two speaker circuits shall be provided per floor or evacuation zone (20,000 square feet maximum).
4. System Devices: Provide analog/addressable system devices where shown and required. All devices shall utilize red LED indicator which shall flash to denote normal active communication and light steadily during an alarm condition. Devices shall be interchangeable with twist-lock bases as applicable. Each device base is required to support an remote LED output, or optional fault isolation circuitry, auxiliary relay contact, or a sounder base with integral piezo horn. Detectors must support physical address setting integral to each device base. Systems that require special programming tools to set operating parameters or extract device history data will not be allowed.
- a. Photoelectric Smoke Detector: Provide analog photoelectric smoke detectors where shown and required.
 - b. Manual Pull Stations: Provide addressable manual stations where shown. The station shall be double action type with screw terminals, toggle switch, and integral addressable electronics. The station shall be constructed of red Lexan with white raised letters and a key reset switch. The station shall be keyed alike to the FACP. Where ambient conditions preclude the use of addressable devices, conventional weatherproof pull stations shall be used. Each conventional device shall be individually addressable via an intelligent addressable module which shall be installed in a heated, ventilated location. Provide Stopper Guards on all pull stations.
5. Primary Notification Appliances: Provide Flush mounted combination Audio/Visual signaling appliances where practical. Stand alone devices may be used to augment combination units when necessary. The contractor shall provide surface mount backboxes and alternate outdoor-rated appliances where ambient conditions dictate. Specific audible and visual characteristics shall be as follows:
- a. Visual Signals: Furnish and install multi-candela, synchronized xenon strobes in compliance with NFPA 72 chapter 4 and rated per UL 1971 testing. Strobes shall have an effective intensity rating of 15 candela in corridors and areas up to 20' x 20', 75 candela in areas up to 40' x 40' and 110 candela in areas up to 50' x 50' or larger.

- b. **Wall-mounted Speakers:** Provide multi-tapped cone speakers with square or rectangular grille with [architect to select red or white finish] where shown or required. Each speaker shall have selective ¼, ½, 1, or 2 watt taps. Each speaker shall produce a sound output level of 84dbA at 10' (1 watt setting). Provide re-entrant-type speaker grilles for devices in outdoor or wash-down areas.

6. **System Accessories**

- a. Refer to Fire-Lite MS-9200UDLS Specifications and Drawing E2-0 for further information.

C. **Installation**

1. Installation shall be supervised and tested by the system supplier. The work shall be performed by skilled technicians under the direction of experienced engineers, all of whom are properly trained and qualified.

D. **Wiring**

1. All wiring for the system shall be in accordance with Articles 760, 725, and 800 of the National Electrical Code and local electrical codes.
2. Provide complete wiring and conduit between all equipment. All devices shall be mounted upon and splices made in UL listed boxes. Wiring splices and transposing or changing of colors shall not be permitted.
3. All junction boxes shall be painted red and labeled as 'Fire Alarm System' with decal or approved markings
4. Fire Alarm control systems and equipment shall be connected to separate dedicated branch circuits, sized as required for proper service. Circuits shall be labeled 'FIRE ALARM'.
5. All exposed wiring shall be installed in conduit. All concealed wiring shall be MC type cable (red in color). All conduit shall be stripped red on 12" increments (minimum), all junction boxes shall be red in color.

E. **Final Tests /Warranty**

1. The system shall be fully tested by a UL certified testing company, in accordance with UL guidelines and NFPA standards. Each and every device shall be tested, and reports shall be provided in accordance with NFPA and Local Code requirements.
2. A copy of the final test report Record of Completion shall be submitted indicating proper functioning of the system and conformance to the specifications. The test shall be performed by UL certified and factory-trained qualified technicians. Each and every device shall be

tested, and standalone operation of remote panels shall be verified. Final testing shall be performed by the same company that shall hold and execute the Test and Inspection contract.

3. The manufacturer shall guarantee all system equipment for a minimum of one year from the date of final acceptance.
4. The contractor shall guarantee all raceways and wiring to be free from inherent mechanical or electrical defects for one (1) year from the date of final acceptance of the system.

F. Training

1. The contractor shall provide the services of the manufacturer's representative for a period of 4 hours, during normal business hours, to instruct the owner's designated personnel and fire department response teams on the operation of the system.

PART 3 - MATERIALS AND WORKMANSHIP

- A. Work shall be executed in workmanlike manner and shall present neat, rectilinear and mechanical appearance when completed. Maintain maximum headroom at all times. Do not run pipes and ducts exposed unless shown exposed on drawings. Material and equipment shall be new and installed according to manufacturer's recommended best practice so that completed installation shall operate safely and efficiently.

3.2 COMMISSIONING

- A. Electrical Contractor required for the work of this Section shall provide all labor, materials and equipment required to assist with the building commissioning of this project in accordance with the requirements outlined in Division 01.

3.3 SPECIAL RESPONSIBILITIES

- A. Coordinate work of this Section with work of other Sections.
 1. Provide information about items furnished under this Section to be installed under other Sections, as necessary.
 2. Obtain detailed information from manufacturers of equipment provided under this Section as to proper methods of installation.
 3. Obtain final roughing dimensions and other information as needed for complete installation of items furnished under other Sections or by Owner.
 4. Keep fully informed of shape, size and position of openings required for material and equipment provided under this and other Sections. Ensure

that openings required for work of this Section are coordinated with work of other Sections. Provide cutting and patching as necessary.

3.4 TESTING, INSPECTION AND CLEANING

- A. Test and inspect work provided under this Section as required by Contract Documents, codes, standards and authorities that have jurisdiction, to satisfaction of Architect. Notify Architect and authorities at least 48 hours before testing or inspection. Do not cover work before testing or inspection.
- B. Furnish Architect with certificates of testing and inspection for electrical systems, indicating approval of authorities that have jurisdiction and conformance with requirements of Contract Documents.
- C. Test wiring and connections for continuity and grounds before fixtures are connected; demonstrate insulation resistance by megger test as required. Insulation resistance between conductors and grounds for secondary distributions systems shall meet NEC requirements.
- D. Verify and correct as necessary: voltages, tap settings, trip settings and phasing on equipment from secondary distribution system to points of use. Test secondary voltages at bus in main switchboard, at panelboards, and at other locations on distribution systems as necessary. Test secondary voltages under no-load and full-load conditions.
- E. Test lighting fixtures with specified lamps in place for 10 hours; check fixtures in sections. Do not operate lamps other than for testing before final inspection by Architect. Replace lamps that fail within 90 days after acceptance by Architect within Contract Price.
 - 1. Provide necessary testing equipment and testing.
- F. Failure or defects in workmanship or materials revealed by tests or inspection shall be corrected promptly and retested. Replace defective material.
- G. Panelboard interiors shall be cleaned and vacuumed. Equipment with damage to painted finish shall be repaired to Architect's satisfaction.
- H. Equipment:
 - 1. After completion of project, clean the exterior surface of equipment included in this section, including concrete residue.

3.5 WIRING METHODS

- A. Install wire and cable in approved raceways as specified and as approved by authorities that have jurisdiction. Surface metal raceways shall not be used unless explicitly specified and shown on Drawings. Do not use surface raceways on floor. Do not use armored cable except as approved by local code

- for lighting and receptacle circuits in suspended ceilings and stud-wall partitions. Homeruns for lighting circuits shall be 3-phase, 4-wire run in conduit.
- B. Wire from point of service connection to receptacles, lighting fixtures, devices, equipment, outlets for future extension, and other electrical apparatus as shown on Drawings. Provide slack wire for connections. Tape ends of wires and provide blank covers for outlet boxes designated for future use.
 - C. Conductors #10 and smaller in branch circuit panelboards, signal cabinets, signal control boards, switchboards and motor control centers shall be bundled. Conductors larger than #10 in switchboards, motor control centers and pull boxes shall be cabled in individual-circuits.
 - D. Two or more conduits installed instead of single conduit shall contain duplicate conductors, including neutrals and ground conductors where required; total capacity of duplicate conductors shall be at least equal to capacity of conductors replaced.
 - E. Follow homerun circuit numbers shown on Drawings to connect circuits to panelboards. Where homerun circuit numbers are not shown on Drawings, divide similar types of connected loads among phase buses so that currents are approximately equal in normal usage. Connect each branch circuit homerun with two or more circuits and common neutral to circuit breaker or switch in three-wire or four-wire branch circuit panelboard so that no two circuits are fed from same bus. Where panelboard cabinets are recessed, provide conduits with sufficient capacity for future conductors for spare branch circuit protective devices and spaces in panelboard; stub up concealed to junction box. Provide extensions above ceiling.
 - F. Electrical metallic tubing may be used generally, if approved by local codes, for lighting fixture and receptacle circuits, telephone, inter-communications, signal and instrumentation circuits, and for control circuits. EMT may be used generally, if approved by authorities, in masonry walls, above hung ceilings, in equipment rooms, in mechanical and electrical chases and closets, in exposed locations along ceilings or walls above normal traffic level and where not subject to accidental damage or abuse. Do not run EMT exposed below 8 feet above finished floor. Conduit below 8'-0" AFF exposed shall be rigid steel.
 - G. Install connectors and couplings as recommended by manufacturers. Compression fittings shall not be used with rigid steel, intermediate metallic or aluminum conduit. Set screw fittings shall not be used with rigid aluminum conduit and shall not be used for other applications, unless specified and approved by Architect. If set-screw connectors are used, tighten to imbed screws in conduit.
 - H. Penetrate waterproof walls of structural slabs and foundation walls only where approved by Architect. Submit proposed penetration points, size openings and penetration methods to Architect for approval.

- I. Provide flexible conduits for connections to electrical equipment and to equipment furnished under Divisions 22 and 23 that are subject to movement, vibration or misalignment; where available space dictates; and where noise transmission must be eliminated or reduced. Flexible conduit shall be liquid-tight under following conditions:
 - 1. Exterior locations
- J. Size rigid steel conduit, EMT and flexible metallic conduit as required by NEC except as specified or shown on Drawings otherwise. Unless shown otherwise on Drawings, telephone conduits shall be at least 1".
- K. Check raceway sizes to determine that green equipment ground conductor fits in same raceway with phase and neutral conductors to meet NEC percentage of fill requirements. Increase duct, conduit, tubing and raceway sizes shown or specified as required to accommodate conductors.
- L. Install conduit systems complete before drawing in conductors. Blow through and swab after plaster is finished and dry, and before conductors are installed.
- M. Expansion/Deflection Fittings: Conduit buried or secured rigidly on opposite sides of building expansion joints and long runs of exposed conduit subject to stress shall have expansion fittings. Fittings shall safely deflect and expand to twice distance of structural movement.
 - 1. Provide separate external copper bonding jumper secured with grounding straps on each end of fitting.
 - 2. Conduits buried in concrete shall cross building expansion joints at right angles; provide expansion fittings as required by manufacturer's instructions. Provide insulated bushings at ends of conduits.
- N. Sealing Fittings: Threaded sealing fittings for rigid steel conduits shall be zinc- or cadmium-coated, cast or malleable iron; sealing fittings for aluminum conduit shall be threaded cast aluminum. Fittings that prevent passage of water vapor shall be continuous drain.
 - 1. Install and seal fittings as required by manufacturer's recommendations. In concealed work, install fittings in flush steel box with blank cover plate.
 - 2. Install sealing fittings at following points, and elsewhere as shown:
 - a. Where conduits enter or leave hazardous areas equipped with explosion-proof lighting fixtures, switches, receptacles and other electrical devices.
 - b. Where conduits pass from warm to cold locations.
 - c. Where required by NEC.

- 3. Secure conduit system as required by NEC.
- O. Provide inserts, hangers, anchors and steel supports as necessary.
- P. Do not install receptacles back to back, in common walls. All receptacle installation shall be staggered.

3.6 INSTALLATION OF LIGHT FIXTURES

- A. Coordinate installation of fixtures with installation of ceiling materials and suspension systems.
- B. Do not install fixtures until work of other trades that may damage fixtures is completed.
- C. Investigate lighting fixture locations and supports to ensure that no interference exists with hangers, ducts, sprinklers, pipes and other equipment.
- D. Provide plaster frames for fixtures recessed in gypsum board or plaster ceiling.
- E. Do not suspend or support lighting fixtures or safety chains from hung ceiling conduit or duct. Support fixtures with threaded rod from structural members only.
- F. Provide unistrut below ducts where fixture locations coincide with duct runs. Provide threaded rods to support unistrut.
- G. Luminaires shall be compatible with flexible wiring system.
- H. Where air is supplied or returned through luminaires, coordinate compatibility of fixtures with air boots and attachments.
- I. Patch spray-on fireproofing damaged during installation.
- J. Support surface-mounted luminaires at least two concealed points to prevent rotation.
- K. Fire-rated enclosures necessary for fixture housings above ceiling will be provided under another Section.
- L. Mounting height of suspended or wall-mounted luminaires shall be shown on Drawings.
- M. Locate ceiling-mounted fixtures as shown on reflected ceiling plans. Locate wall- and floor-mounted fixtures as shown on Electrical Drawings.
- N. Coordinate aiming of adjustable fixtures with Architect.

3.7 CABLE PATHWAYS

- A. Install cables in pathways provided by the Electrical contractor or required under execution part of this SECTION.
- B. Provide all equipment and cabling for a complete installed operating system. In general, pathways, outlet boxes and grounding are provided by the Electrical contractor. However, it is the Contractor under this Section's responsibility to coordinate with the drawings and specifications for the Electrical Specifications and to provide all pathways and outlet boxes required that are not provided by the Electrical contractor.

END OF SECTION 26 00 00

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

Subject: SMR Building C Latrine Renovations

EXHIBIT B ATTACHMENT 2

BLDG C. LATRINES PROJECT DRAWINGS

Contractor clearly understands BLDG C. latrines project drawings and will meet all requirement within these attached document.

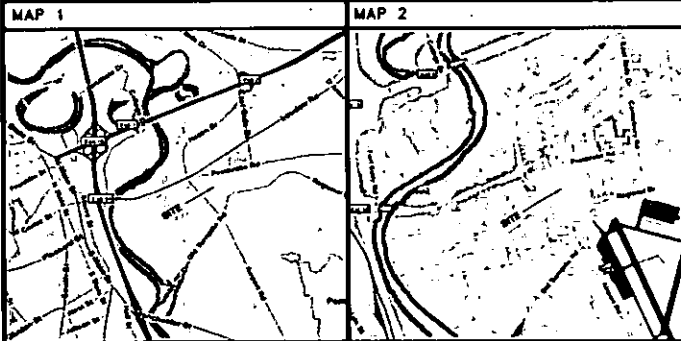
NEW HAMPSHIRE ARMY NATIONAL GUARD NHARNG - CONCORD SMR BUILDING "C" LATRINE RENOVATIONS



FOR BIDDING & CONSTRUCTION
04/14/2021
1 Minuteman Way, Concord, NH 03301

PROJECT NUMBER: 5038

DRAWING LIST		
SHEET NUMBER	SHEET DISCIPLINE	DRAWING TITLE
COVER		
ARCHITECTURAL		
AA-1	ARCHITECTURAL	LEGEND & GENERAL INFORMATION
DLB	ARCHITECTURAL	DEMOLITION - PARTIAL FLOOR PLAN & REFLECTED CEILING PLAN
AL-1	ARCHITECTURAL	NEW PARTIAL FLOOR PLAN & REFLECTED CEILING PLAN
AL-2	ARCHITECTURAL	INTERIOR ELEVATIONS
AZ-1	ARCHITECTURAL	DETAILS, SCHEDULES & PARTITION TYPES
MECHANICAL/PLUMBING		
MB-1	MECHANICAL/PLUMBING	GENERAL NOTES, APPROPRIATION, LEGEND AND SCHEDULE
DB-1	MECHANICAL/PLUMBING	NEW PARTIAL FLOOR PLAN & DEMO MECHANICAL
DP-1	MECHANICAL/PLUMBING	DEMOLITION PARTIAL FLOOR PLAN - PLUMBING
MB-2	MECHANICAL/PLUMBING	NEW PARTIAL FLOOR PLAN - MECHANICAL
PA-1	MECHANICAL/PLUMBING	GENERAL NOTES, LEGENDS, AND SCHEDULE
PA-2	MECHANICAL/PLUMBING	NEW PARTIAL FLOOR PLUMBING
ELECTRICAL		
EB-1	ELECTRICAL	ELECTRICAL LEGEND, NOTES AND SCHEDULES
EB-2	ELECTRICAL	ELECTRICAL SCHEDULES AND WIRING
ED-1	ELECTRICAL	ELECTRICAL DEMOLITION PLAN
EL-1	ELECTRICAL	ELECTRICAL NEW WORK PLAN LIGHTING AND POWER



DESIGNED AND ENGINEERED BY:

TURNER GROUP

THE T.L. TURNER GROUP Inc.
ARCHITECTS • ENGINEERS
CONSTRUCTION MANAGEMENT • ENVIRONMENTAL
OF LAND AND
WATER • FOR HISTORIC AND
SUSTAINABLE / FABRICATED
CONSTRUCTION

MEMBER OF A GROUP OF
COMPANIES

BLW ENGINEERS

301 North Main Street
Concord, NH 03301
603.224.1122
603.224.1124

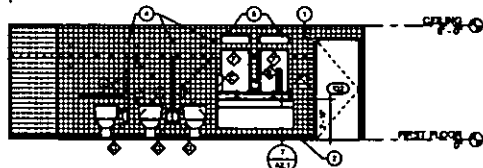
CIVIL ENGINEERING	THE T.L. TURNER GROUP INC.	603.224.1122	603.224.1124
STRUCTURAL ENGINEERING	TURNER BUILDING SCIENCE, LLC.	603.224.1122	603.224.1124
MECHANICAL ENGINEERING	BLW ENGINEERS, INC.	603.224.1122	603.224.1124
PLUMBING ENGINEERING			
FIRE PROTECTION ENGINEERING			
ELECTRICAL ENGINEERING			
CONSTRUCTION MANAGEMENT			

ARCHITECT OF RECORD:

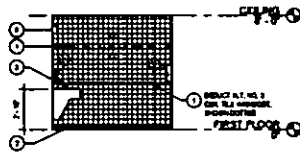
BARRY A. WOOD, SA
T.L. TURNER GROUP, INC.

COVER A0.0

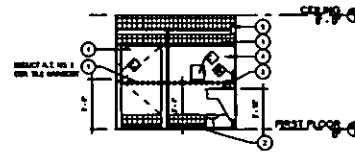
1/8" = 1'-0"



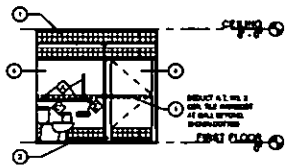
1 WOMEN'S EAST ELEVATION
Scale: 1/4" = 1'-0"



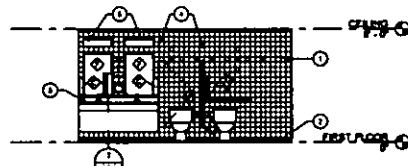
2 WOMEN'S SOUTH ELEVATION
Scale: 1/4" = 1'-0"



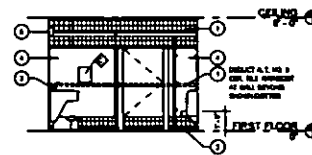
3 WOMEN'S NORTH ELEVATION
Scale: 1/4" = 1'-0"



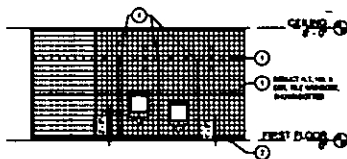
4 WOMEN'S SOUTH ACCESSIBLE ELEVATION
Scale: 1/4" = 1'-0"



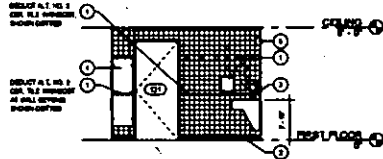
5 MEN'S WEST ELEVATION
Scale: 1/4" = 1'-0"



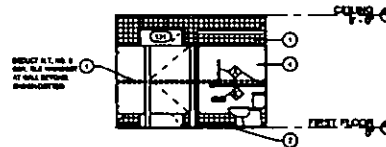
6 MEN'S NORTH ELEVATION
Scale: 1/4" = 1'-0"



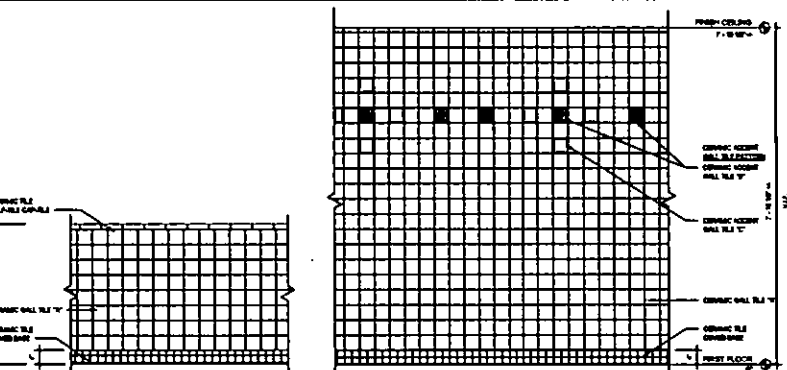
7 MEN'S EAST ELEVATION
Scale: 1/4" = 1'-0"



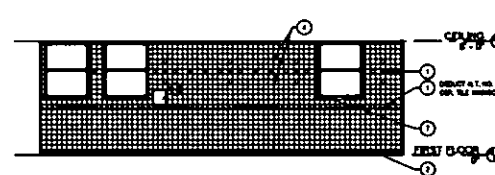
8 MEN'S SOUTH ELEVATION
Scale: 1/4" = 1'-0"



9 MEN'S SOUTH ACCESSIBLE ELEVATION
Scale: 1/4" = 1'-0"



10 ELEVATION DETAIL - WALL TILE PATTERN
Scale: 3/4" = 1'-0"



11 WOMEN'S WEST ELEVATION
Scale: 1/4" = 1'-0"

TOILET ACCESSORIES LEGEND		
MARK	DESCRIPTION	COMMENTS
1	SPRINKLER HEADS TO BE INSTALLED IN ALL TOILET ROOMS	SEE DETAIL 11.1
2	SMOKE DETECTOR	SEE DETAIL 11.2
3	SMOKE EXHAUST SYSTEM	SEE DETAIL 11.3
4	SMOKE EXHAUST SYSTEM	SEE DETAIL 11.4
5	SMOKE EXHAUST SYSTEM	SEE DETAIL 11.5
6	SMOKE EXHAUST SYSTEM	SEE DETAIL 11.6
7	SMOKE EXHAUST SYSTEM	SEE DETAIL 11.7

CONSTRUCTION LEGEND

1 CERAMIC WALL TILE W/SPACER
2 CERAMIC WALL TILE W/SPACER

INTERIOR ELEVATION NOTES

- 4 x 4 CERAMIC WALL TILE W/SPACER
TILE & EPoxy GROUT. SEE DETAIL
10A.1.2 DUCT ALTERNATE NO. 3
CERAMIC WALL TILE W/SPACER
W/SPACER TILE & EPoxy GROUT.
WHERE INDICATED ON
INTERIOR ELEVATIONS. SEE DETAIL
10A.1.2.
- CERAMIC TILE COMED SHINE W/SPACER
GROUT.
- ONE-PIECE SOLID SURFACE
MANUFACTURED LAVATORY SYSTEM.
AS SPECIFIED. DUCT ALTERNATE NO. 3
1" HIGH SOLID SURFACE COUNTER &
BACKSPLASH. APPROX. LAMP APPROX. AS
DETAILED. SEE DETAIL 10A.1.2.
- SOLID PLASTIC TOILET FIXTURES
OR URINALS. SEE DETAIL 10A.1.2.
- WALL MOUNTED LIGHT FIXTURES
- VINYL COMED SHINE
- NEW SOLID SURFACE HOOKS WILL
INSTALL ON NEW

DEDUCT ALTERNATES

NO. 1: EXISTING VINYL TILE, BACKSPLASH, &
SINK CABINETS TO REMAIN
IN BREAKROOM 133 & CORRIDOR 134
CONTRACTOR TO FURNISH
& INSTALL NEW METAL FLOORING
TRANSITION STRIP BETWEEN
CORRIDOR 133 & CORRIDOR 134.

NO. 2: PROVIDE NEW COUNTER
W/BACKSPLASH. APPROX. COMPLETE
LAVATORY ASSEMBLY (SEE PLUMBING
DWG'S) AS DETAILED
(SEE DETAIL 10A.1.2) IN LIEU OF NEW
ONE-PIECE SOLID SURFACE
MANUFACTURED LAVATORY SYSTEM
AS SPECIFIED.

NO. 3: PROVIDE NEW 4 x 4 CERAMIC WALL TILE
W/SPACER W/SPACER
WALL CAP TILE & EPoxy GROUT,
WHERE INDICATED ON
INTERIOR ELEVATIONS. SEE WAINSCOT
WALL TILE DETAIL 10A.1.2.
IN LIEU OF NEW 4 x 4 CERAMIC WALL
TILE W/SPACER TILES
& EPoxy GROUT. SEE CEILING HEIGHT
WALL TILE DETAIL 10A.1.2.

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INTERIOR ELEVATIONS

A1.2

INTERIOR ELEVATIONS

ROOM FINISH SCHEDULE														
ROOM NUMBER	ROOM NAME	FLOOR	NORTH WALL		EAST WALL		SOUTH WALL		WEST WALL		CEILING		SIGNAGE	COMMENTS
			SUBSTRATE	FINISH	SUBSTRATE	FINISH	SUBSTRATE	FINISH	SUBSTRATE	FINISH	HEIGHT	FINISH		
1	OFFICE	1ST	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	8'-0"	PAINT	1	SEE FINISH NOTES
2	CONFERENCE	1ST	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	8'-0"	PAINT	1	SEE FINISH NOTES
3	RECEPTION	1ST	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	8'-0"	PAINT	1	SEE FINISH NOTES
4	RESTROOM	1ST	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	CONCRETE	PAVING	8'-0"	PAINT	1	SEE FINISH NOTES

DOOR AND FRAME SCHEDULE														
DOOR #	ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICKNESS	MAT.	FNL	FRAME		DETAIL LOCATION		FUNCTION	HARDWARE SET	DOOR NOTES
								MAT.	FNL	HEAD	JAMB			
1	INT. H.M.	1	3'-0"	7'-0"	1 1/2"	02	11	1	1	1	1	1	1	SEE FINISH NOTES
2	INT. H.M.	2	3'-0"	7'-0"	1 1/2"	02	11	1	1	1	1	1	1	SEE FINISH NOTES

GENERAL FINISH NOTES

- SEE FINISH NOTES FOR FINISH SCHEDULES
- ALL ELECTRICAL WORK TO BE COMPLETED PRIOR TO FINISHING
- SEE FINISH NOTES FOR FINISH SCHEDULES
- SEE FINISH NOTES FOR FINISH SCHEDULES

FINISH SCHEDULE NOTES

- SEE FINISH NOTES FOR FINISH SCHEDULES
- SEE FINISH NOTES FOR FINISH SCHEDULES

INTERIOR MATERIALS LEGEND

FLAME RESISTANT

- FL-1 LIGHT FLAME RESISTANT - 1/2"
- FL-2 SOLARSTOP SOLID FLAME RESISTANT - 1/2"

FINISHES

- F-1.1 POLYURETHANE TILE ADHESIVE
- F-1.2 POLYURETHANE TILE ADHESIVE (SCHEDULED)
- F-1.3 CERAMIC TILE ADHESIVE - 1/2"
- F-1.4 JOINTS/CRACKS FILLER - 1/2"
- F-1.5 JOINTS/CRACKS FILLER - 1/2"
- F-1.6 JOINTS/CRACKS FILLER - 1/2"
- F-1.7 JOINTS/CRACKS FILLER - 1/2"
- F-1.8 JOINTS/CRACKS FILLER - 1/2"
- F-1.9 JOINTS/CRACKS FILLER - 1/2"
- F-1.10 JOINTS/CRACKS FILLER - 1/2"
- F-1.11 JOINTS/CRACKS FILLER - 1/2"
- F-1.12 JOINTS/CRACKS FILLER - 1/2"
- F-1.13 JOINTS/CRACKS FILLER - 1/2"
- F-1.14 JOINTS/CRACKS FILLER - 1/2"
- F-1.15 JOINTS/CRACKS FILLER - 1/2"
- F-1.16 JOINTS/CRACKS FILLER - 1/2"
- F-1.17 JOINTS/CRACKS FILLER - 1/2"
- F-1.18 JOINTS/CRACKS FILLER - 1/2"
- F-1.19 JOINTS/CRACKS FILLER - 1/2"
- F-1.20 JOINTS/CRACKS FILLER - 1/2"



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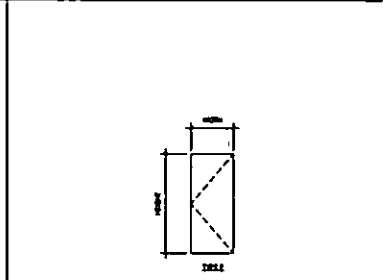
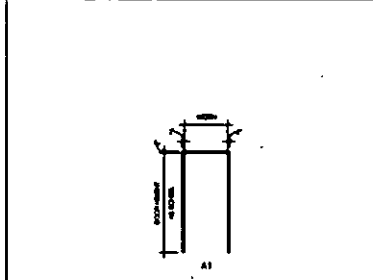
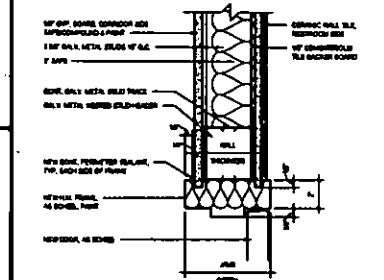
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 BUILDING "C" LATRINE
 RENOVATIONS
 1 Pleasant Way, Concord, NH 03301

FOR BIDDING & CONSTRUCTION
 09/18/2011



1 INT. H.M. DOOR HEAD
 Scale: 3/4" = 1'-0"

2 FRAME TYPES
 Scale: 1/4" = 1'-0"

3 DOOR TYPES
 Scale: 1/4" = 1'-0"

7 RESTROOM COUNTER DETAIL
 ALTERNATE NO. 2
 Scale: 1" = 1'-0"

GENERAL DOOR NOTES

- DOORSET ALL HOLLOW METAL. WEIGHT WEIGHTS AND DIMENSIONS TO BE AS SHOWN.

DOOR SCHEDULE LEGEND

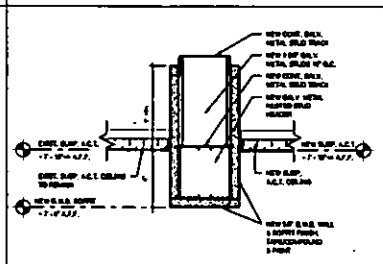
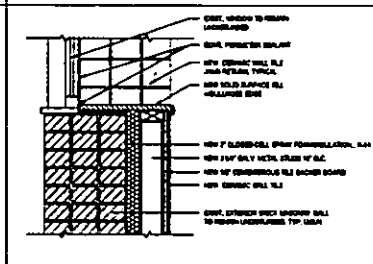
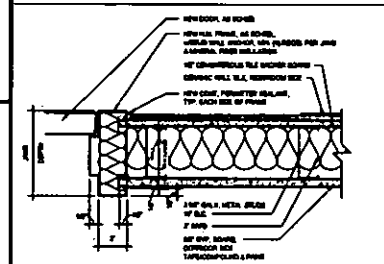
- 1 - HOLLOW METAL
- 2 - POLYURETHANE
- 3 - FINISHES SEE FINISH SCHEDULE

HARDWARE SETS

- 1 - HOLLOW METAL
- 2 - POLYURETHANE
- 3 - FINISHES SEE FINISH SCHEDULE

PARTITION NOTES

- ALL PARTITIONS ARE TO FACE UNLESS OTHERWISE NOTED.
- SEE FINISH NOTES FOR FINISH SCHEDULES.
- SEE FINISH NOTES FOR FINISH SCHEDULES.

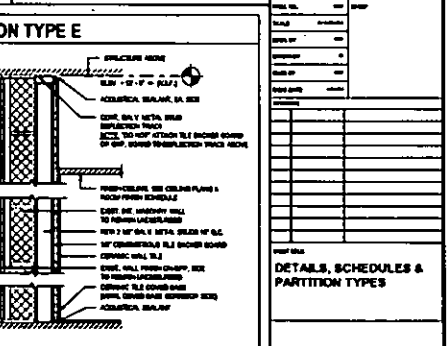
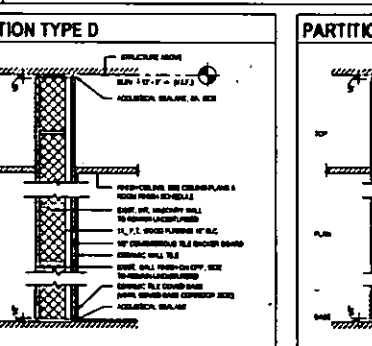
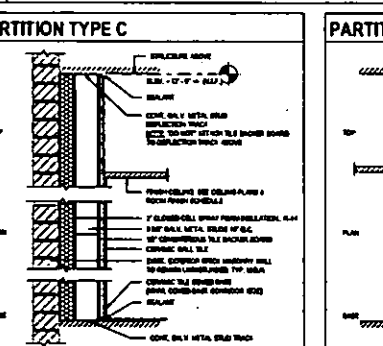
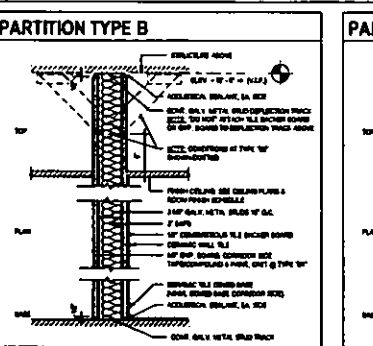
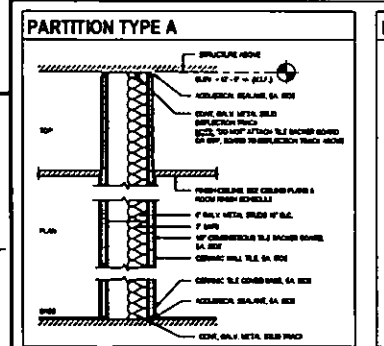


4 INT. H.M. DOOR JAMB
 Scale: 3/4" = 1'-0"

5 INT. WINDOW SILL DETAIL
 Scale: 1 1/2" = 1'-0"

6 DETAIL - SUSP. GWB SOFFIT
 Scale: 3/4" = 1'-0"

7 RESTROOM COUNTER DETAIL
 ALTERNATE NO. 2
 Scale: 1" = 1'-0"



8 PARTITION TYPE A
 Scale: 1 1/2" = 1'-0"

9 PARTITION TYPE B
 Scale: 1 1/2" = 1'-0"

10 PARTITION TYPE C
 Scale: 1 1/2" = 1'-0"

11 PARTITION TYPE D
 Scale: 1 1/2" = 1'-0"

12 PARTITION TYPE E
 Scale: 1 1/2" = 1'-0"

A2.1

Scale: 1/8" = 1'-0"
 Scale: 1/8" = 1'-0"
 Scale: 1/8" = 1'-0"

DEMOLITION NOTE LEGEND

(1) REMOVE VINTL TILE FLOORING & CONC FLOOR SLAB IN THIS GARRETY TO THE EXISTING EXTERIOR FINISHES. DEMOLISH & REMOVE TO EXISTING EXTERIOR FINISHES. IF NEW PLUMBING OR ELECTRICAL IS TO BE INSTALLED IN THIS GARRETY, SEE DETAIL FOR FLOOR FINISH & DEMOLITION WORK (P.15).	(11) REMOVE 8" x 8" WALL BRICK CERAMIC TILE PROVIDE JAMB APPLICABLE & WOOD FURNISHING FROM CALL PARTITION. TO EXISTING INDICATED CALL PARTITION TO REMAIN ONLY WHERE INDICATED.
(2) REMOVE VINTL TILE FLOORING, BASE, MOHRE, ETC. IN THIS GARRETY IN PREPARATION FOR A CORRIDOR ON TO THE EXISTING INDICATED IN DETAIL # 1. REMOVE VINTL TILE & BASE TO EXISTING EXTERIOR FINISHES & CONCORD FIN.	(12) REMOVE SOLID PARTICLES FROM THIS GARRETY.
(3) REMOVE BASEBOARD A.C.L. CEILING BY GARRETY TO EXISTING INDICATED EXISTING LOWER CEILING TO REMAIN UNCHANGED.	(13) REMOVE WALLS ROOM ACCESSIBLE & TURN OVER TO OWNER.
(4) REMOVE LIGHT FIXTURES, OCCUPANCY SENSOR, SMOKE DETECTOR, ETC. IN THIS GARRETY. SEE ELECTRICAL DRAWINGS FOR ELECTRICAL LIGHT FIXTURES TO BE TURNED OVER TO OWNER.	(14) REMOVE WALLING MATERIAL, SLAB ON GROUND, ETC. IN THIS GARRETY TO EXISTING INDICATED. SEE PLUMBING DRAWINGS.
(5) REMOVE MESH CEILING SUPPLY, RETURN & CONTROL SYSTEMS IN THIS GARRETY. SEE MECHANICAL DRAWINGS.	(15) REMOVE WEAIR APPROPRIATE IN THIS GARRETY. SEE ELECTRICAL DRAWINGS.
(6) REMOVE BASEBOARD GASOLINE BURNER GARRETY. SEE MECHANICAL DRAWINGS.	(16) REMOVE COUNTER & CABINETS IN THIS GARRETY.
(7) REMOVE PARTITION COMPOSING OF 1/2" G.I.M., WOOD FINISH & 3/4" WALL PANEL WHERE INDICATED.	(17) REMOVE COUNTER, SINK & SINK CABINETS IN THIS GARRETY. REMOVE A TO EXISTING NO. 1 FINISH COUNTER & SINK ONLY. SINK CABINETS TO REMAIN UNCHANGED.
	(18) REMOVE SECTION TO REMAIN UNCHANGED EXISTING REFRIG. CURTAIN. SEE A TO EXISTING NO. 1 FINISHES & REFRIGERATOR.
	(19) RELOCATE EXISTING DRAINING FOUNDATION. SEE PLUMBING DRYS.

GENERAL DEMOLITION NOTES

1. DEMOLITION SYSTEMS USED BY REMOVER PROVIDE CAP W/ILE PLAN ON DRAW TO BEST COORDINATED AND MINIMIZE COLLISIONS OF THE SYSTEMS.
2. PROVIDE TEMPORARY BRACINGS AND PROVISIONS TO PREVENT SLUMP TO PEOPLE EXPOSED TO EXISTING CONSTRUCTION TO REMAIN.
3. DURING DEMOLITION ACTIVITIES, NOTIFY NEIGHBORING BUILDINGS AND PROPERTY OWNERS. UNLESS OTHERWISE NOTIFIED, DEMOLITION SHALL BE IN ACCORDANCE TO THE GENERAL DEMOLITION CONTRACT DOCUMENTS BY THE CONTRACTOR.
4. THE CONTRACTOR IS TO PROTECT THE EXISTING BUILDING STRUCTURE AND REMAIN TO REMOVE THE CONTRACTOR IS TO KEEP AND PROTECT ALL UTILITIES AS INDICATED.



The H.L. Turner Group Inc.
 27 Lewis Rd.
 Concord, New Hampshire 03301
 603.254.1127
 www.turner.com

Contract: 2014-0103-0001
 Date: 01/21/2014



BLW ENGINEERS
 1000 North State
 Concord, NH 03301
 603.254.1127



NEW HAMPSHIRE ARMY NATIONAL GUARD
WARNO - CONCORD SBR BUILDING "C" LATRINE RENOVATIONS
 1 Elmwood Way, Concord, NH 03301

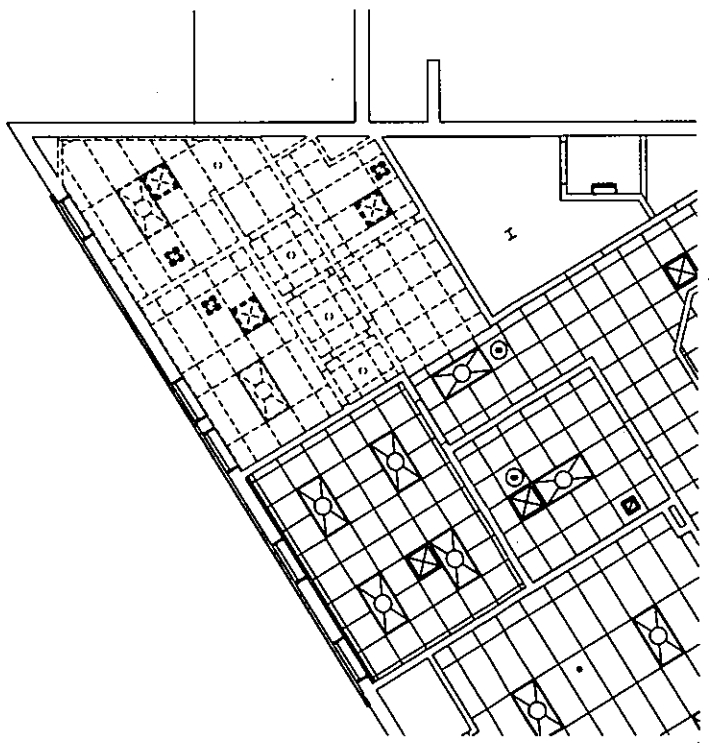
FOR BIDDING & CONSTRUCTION
 04/14/2014

DEDUCT ALTERNATES

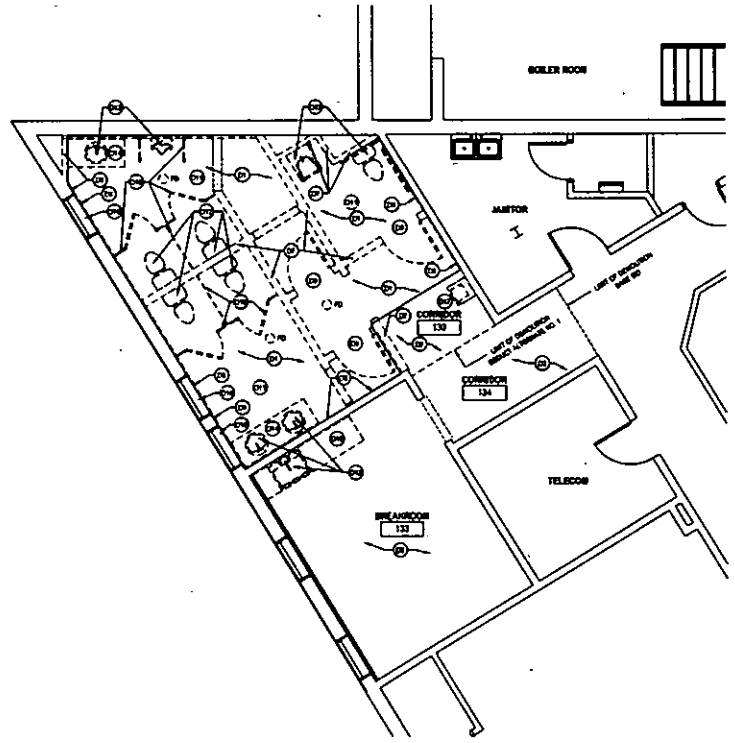
NO.	DESCRIPTION	NO.	DESCRIPTION
NO. 1	EXISTING VINTL TILE, BASEBOARD, & SINK CABINETS TO REMAIN IN BREAKROOM 133 & CORRIDOR 134; CONTRACTOR TO FURNISH & INSTALL NEW METAL FLOORING TRANSITION STRIP BETWEEN CORRIDOR 133 & CORRIDOR 134.	NO. 2	REMOVE EXISTING WOOD FLOORING IN BREAKROOM 133.
NO. 2	REMOVE EXISTING WOOD FLOORING IN BREAKROOM 133.	NO. 3	REMOVE EXISTING WOOD FLOORING IN BREAKROOM 133.

DEMOLITION - PARTIAL FLOOR PLAN & REFLECTED CEILING PLAN

D1.0



DEMOLITION REFLECTED CEILING PLAN
 Scale: 1/4" = 1'-0"



DEMOLITION FLOOR PLAN
 Scale: 1/4" = 1'-0"

DEMOLITION - PARTIAL FLOOR PLAN & REFLECTED CEILING PLAN
 D1.0
 04/21/2014

MECHANICAL LEGEND

MECHANICAL LEGEND table with columns: SYMBOL, ABBREVIATION, DESCRIPTION, APPARATUS, SHEET METAL, PIPING. Includes symbols for valves, ducts, and equipment.

DRAWING LIST - MECHANICAL

GENERAL NOTES section with 14 numbered items detailing drawing requirements, coordination, and installation instructions.

SUPPLY DIFFUSER AND GRILLE SCHEDULE table with columns: TAG, ROOM, TYPE, SIZE, FLOW, SOUND, etc. Includes notes for installation.

FAN SCHEDULE table with columns: TAG, ROOMS, TYPE, DRIVE, FLOW, RPM, etc. Lists fan specifications for rooms SP-1 and SP-2.

FINTUBE RADIATION SCHEDULE table with columns: TAG, MANUFACTURER, MODEL, ELEMENT TYPE, CAPACITY, etc. Lists radiator specifications for room SP-2.



The H.L. Turner Group, Inc. logo and address information.



BLW ENGINEERS logo and contact information.

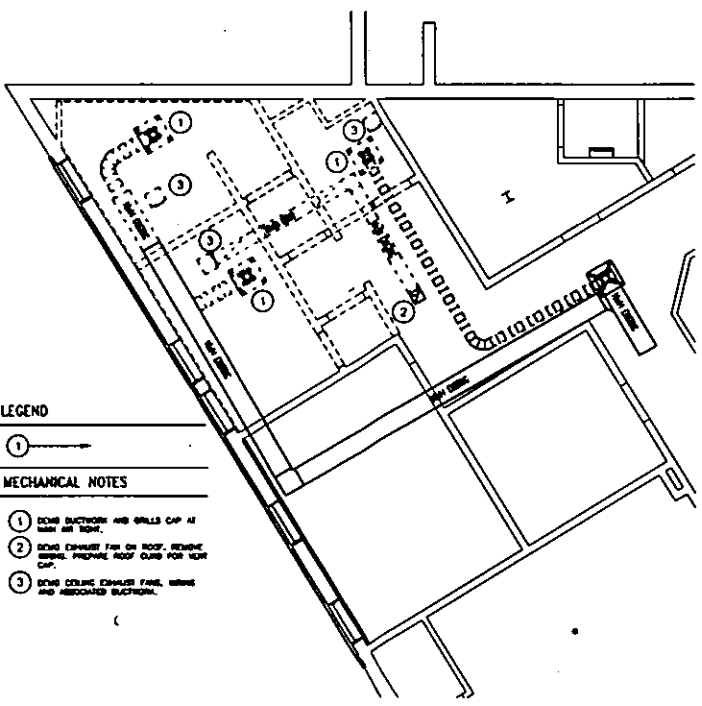
NEW HAMPSHIRE NATIONAL GUARD logo and project name: MARIANO - CONCORD SBR BUILDING 'C' LATRINE RENOVATIONS.

FOR BID AND CONSTRUCTION 04-14-2021



GENERAL NOTES, ABBREVIATIONS, LEGEND AND SCHEDULE

M-1



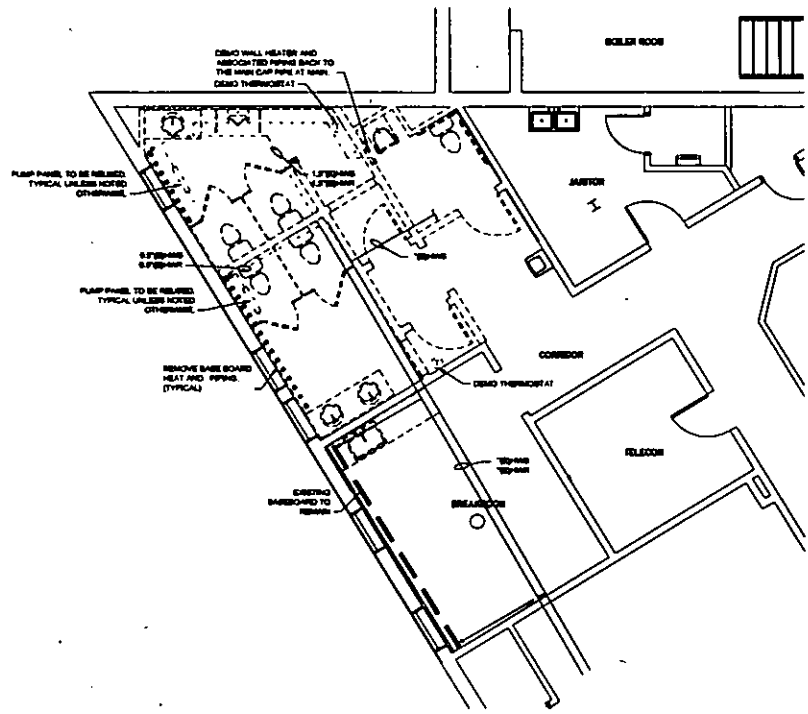
LEGEND



MECHANICAL NOTES

- ① DEMO DUCTWORK AND WALLS CAP AT MAIN AIR INLET.
- ② DEMO EXHAUST FAN ON ROOF, REMOVE PANELS, PREPARE ROOF CURB FOR NEW CAP.
- ③ DEMO CEILING EXHAUST FAN, WIRE AND ASSOCIATED DUCTWORK.

② NEW PARTIAL FLOOR PLAN - MECHANICAL DEMO CEILING
Scale: 1/4" = 1'-0"



① NEW PARTIAL FLOOR PLAN - DEMO MECHANICAL
Scale: 1/4" = 1'-0"



The H.L. Turner Group Inc.
27 Larkin Rd.
Concord, New Hampshire 03304
603.225.1120
www.turner.com

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NEW HAMPSHIRE ARMY NATIONAL GUARD
NHARRG - CONCORD SMR
BUILDING "C" LATRINE
RENOVATIONS
1 Elm Street Way, Concord, NH 03301

FOR BID AND CONSTRUCTION
64-14-3871

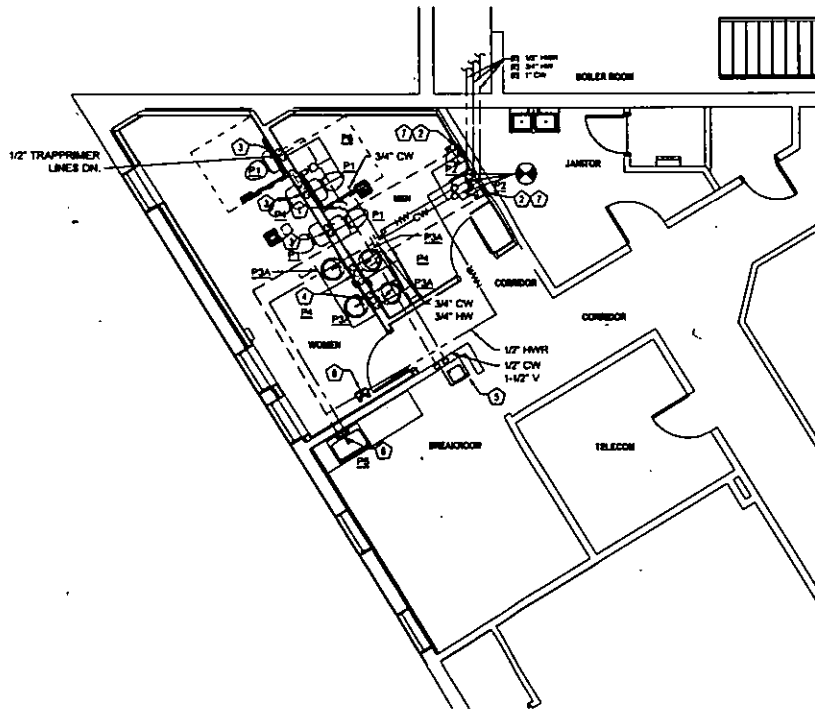
Project No.	64-14-3871
Date	08/01/08
Scale	AS SHOWN
Author	JK
Checker	JK
Drawn by	JK
Scale	AS SHOWN



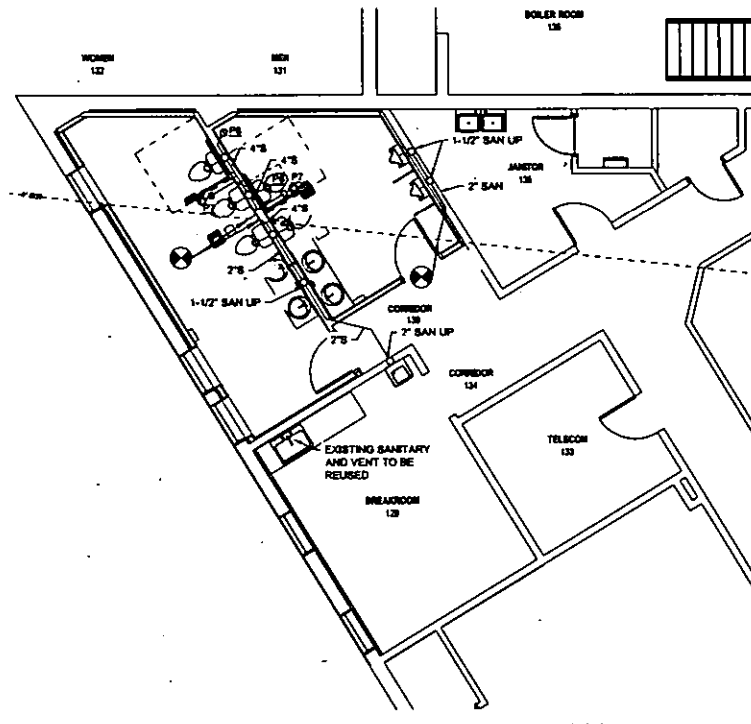
NEW PARTIAL FLOOR PLAN & DEMO MECHANICAL



DM-1



7 NEW PARTIAL FLOOR PLAN - PLUMBING
Scale: 1/4" = 1'-0"



7.2 NEW PARTIAL FLOOR PLAN - PLUMBING UNDERFLOOR
Scale: 1/4" = 1'-0"

- ### KEYNOTES
- 1 CHANGES TO THIS PLAN SHALL BE MADE UP TO 24 HOURS BEFORE THE START OF WORK. ALL CHANGES SHALL BE MADE BY THE ARCHITECT OR HIS AUTHORIZED REPRESENTATIVE.
 - 2 1/2" CW AND 1/2" SAN TO BE 1-1/2" DIA. UP FROM SLAB.
 - 3 1/4" CW AND 1/2" SAN TO BE 1" DIA. UP FROM SLAB.
 - 4 1/2" CW AND 1/2" SAN TO BE 1-1/4" DIA. UP FROM SLAB.
 - 5 EXISTING BRASSING SHALL BE RELOCATED, PROVIDED THAT THE LOCATION OF THE BRASSING IS NOT CHANGED.
 - 6 1/2" CW AND 1/2" SAN TO BE 1-1/4" DIA. UP FROM SLAB.
 - 7 FLOOR UNDER FLOOR FINISHES TO BE AS SHOWN ON THE PLAN TO BE MADE.
 - 8 BALANCE VALVE SET TO 1 GPM.

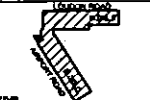


The H.A. Turner Group Inc.
27 Landon Rd.
Concord, New Hampshire 03301
603.224.1122
turner.com

Architect of Record
The H.A. Turner Group Inc., 27 Landon Rd., Concord, NH 03301



BLW ENGINEERS
1111 Elm Street
Concord, NH 03301
603.224.1122
blw-engineers.com



NEW HAMPSHIRE ARMY NATIONAL GUARD
NHARG - CONCORD SBR
BUILDING "C" LATRINE
RENOVATIONS
1 Milliken Way, Concord, NH 03301

FOR BID AND CONSTRUCTION
04-14-2021



NO.	DATE	DESCRIPTION

NEW PARTIAL FLOOR PLUMBING

P-2

A B C D E F

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

**EXHIBIT C, P37 AGREEMENT
THE CONTRACT PRICE, METHOD OF PAYMENT AND TERMS OF PAYMENT**

SUBJECT: Subject: SMR Building C Latrine Renovations

The Contract Price

DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES will pay the contractor a maximum total of \$180,630.00. This amount shall not be exceeded without issuance of an amendment to this agreement and approval by the Governor and Executive Council of the State of New Hampshire.

The undersigned, having carefully examined the specifications for the referenced services, hereby proposes to furnish all materials and to perform all work for the above-captioned project in strict accordance with said specifications for the following price amount.

Contract price: \$180,630.00

Total contract price: \$180,630.00

Terms and Method of Payment

1. The Department will manifest payments to the Contractor each calendar month on the basis of duly certified and approved estimate of the work performed during the preceding period. In preparing estimates, the material delivered on the site and any preparatory work done may be taken into consideration.
2. At least ten (10) days before the end of the billing period, the Contractor shall submit to the Department an itemized Requisition for Payment, supported by such data substantiating the Contractor's right to payment as the Department may require. If payment is to be made on account of materials or equipment not incorporated in the work, but delivered and suitably

stored at the site, such payment shall be conditional upon submission by the Contractor of bills of sale or such other procedure satisfactory to the Department to establish the State's title to such materials or equipment or otherwise protect the State's interest including applicable insurance.

3. Immediately upon receipt of the Department Approved Monthly Requisition for Payment, Contractor shall post same at the Contractor's Field Office or project site in a location where Subcontractors and Suppliers have clear access.
4. A five (5) percent retainage of the value of the work performed on each partial estimate will be deducted and retained by the Department until after completion of the entire Contract in an acceptable manner. The balance remaining after the specified percentage has been retained, less all previous payments, will be certified for payment on each partial estimate.
5. Within thirty (30) days after acceptance, the Department shall pay to the Contractor the amount of the Contract less all prior payments. All prior payments and estimates, including those relative to extra work, shall be subject to correction by this payment, which is throughout this Contract called the Final Payment.
6. Retainage will be released at Final Payment.
 - a. After the Certificate of Substantial Completion has been issued, upon written application by the Contractor and with the approval of the Surety, the Department may release a portion of the retained amount.
7. Payment for Material on Hand:
 - a. Partial payments are made for materials to be incorporated in the Work, provided the materials meet the requirements of the Contract and are delivered on, or in the vicinity of, the Project site and stored in acceptable places. Partial payments will not exceed 90 percent of the Contract unit price for the item or the amount supported by copies of paid invoices, freight bills, or other supporting documents required by the Department. The quantity paid will not exceed the corresponding quantity estimate in the Contract. No partial payment will be made on living or perishable materials until incorporated in the Work.
 - b. When material payments exceed \$100,000 or 10 percent (10%) of the total contract amount, whichever is less, notarized copies of paid invoices or copies of canceled checks for all such materials must be submitted to the Department within 45 days of the end date of the estimate on which the material allowance was paid. Failure to provide such documentation will result in the deduction of such material allowance from future estimates until documentation is provided.
 - c. All material and work covered by partial payments made shall thereupon become the sole property of the Department, but this provision shall not be construed as

relieving the Contractor of the sole responsibility of all materials and work upon which payments have been made or the restoration of any damaged work or as a waiver of the right of the State to require the fulfillment of all the terms of the Contract.

8. Payment for Material not on hand:

- a. The Department will not pay for products and or materials that have not been delivered and stored properly on the construction site.

9. Release of Claims:

- a. Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver a complete release of all claims arising under and by virtue of this Contract, including claims for all Subcontractors and suppliers of either materials or labor, plus a release of the Contract Bond and a statement that all Subcontractors and suppliers have been paid. The Department, may pay any and all such claims, in whole or in part, and deduct the amount or amounts so paid from any partial or final payment.

10. Final Payment:

- a. Application for Final Payment received from the Contractor will be processed for payment not less than 60 days after project acceptance and final completion unless accompanied by a release of the Contract Bond. This payment shall be the amount of the Contract, amended by approved change orders, less previous payments minus liquidated damages, additional penalties or holdbacks. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

11. Acceptance of Final Payment Constitutes Release:

- a. The acceptance of the Final Payment by the Contractor shall be and shall operate as a release to the Contractor of all claims and of all liability to the Department for all things done or furnished in connection with this work. No payment, however, final or otherwise, shall operate to release the Contractor and its Sureties from any obligations under this Contract or the Contract Bond. Acceptance of Final Payment shall not impact any warranties provided by the Contractor with respect to this project.

Invoices will be submitted by the contractor to:

DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES
BA Office
4 Pembroke Road, Bldg. C
Concord, NH 03301-5652

State of New Hampshire

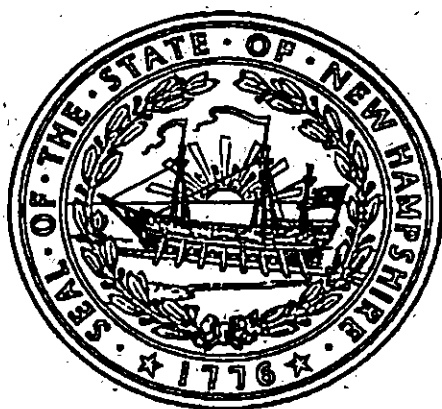
Department of State

CERTIFICATE

I, William M. Gardner, Secretary of State of the State of New Hampshire, do hereby certify that JBC CONSTRUCTION LLC is a New Hampshire Limited Liability Company registered to transact business in New Hampshire on June 07, 2018. I further certify that all fees and documents required by the Secretary of State's office have been received and is in good standing as far as this office is concerned.

Business ID: 796577

Certificate Number: 0005366171



IN TESTIMONY WHEREOF,

I hereto set my hand and cause to be affixed
the Seal of the State of New Hampshire,
this 12th day of May A.D. 2021.

A handwritten signature in black ink, appearing to read "William M. Gardner".

William M. Gardner
Secretary of State



State of New Hampshire

Department of State

2021 ANNUAL REPORT

Filed
Date Filed: 1/18/2021
Effective Date: 1/18/2021
Business ID: 796577
William M. Gardner
Secretary of State

BUSINESS NAME: JBC CONSTRUCTION LLC
BUSINESS TYPE: Domestic Limited Liability Company
BUSINESS ID: 796577
STATE OF FORMATION: New Hampshire

CURRENT PRINCIPAL OFFICE ADDRESS	CURRENT MAILING ADDRESS
14 apple blossom drive. Londonderry, NH, 03053, USA	14 apple blossom drive Londonderry, NH, 03053, USA

REGISTERED AGENT AND OFFICE	
REGISTERED AGENT: Dan Callahan	
REGISTERED AGENT OFFICE ADDRESS:	14 apple blossom drive Londonderry, NH, 03053, USA

PRINCIPAL PURPOSE(S)	
NAICS CODE	NAICS SUB CODE
Construction	Commercial and Institutional Building Construction

MANAGER / MEMBER INFORMATION		
NAME	BUSINESS ADDRESS	TITLE
Dan Callahan	PO Box 107, 14 apple blossom drive, Londonderry, NH, 03053, USA	Member
Dan Callahan	14 apple blossom drive, P.O. Box 107, Londonderry, NH, 03053, USA	Member

I, the undersigned, do hereby certify that the statements on this report are true to the best of my information, knowledge and belief.		
Title: Member		
Signature: Dan Callahan		
Name of Signer: Dan Callahan		

(Limited partnership, Limited liability professional partnership or LLC)

Certificate of Authority # 3

Limited Partnership or LLC Certification of Authority

I, Dan Callahan, hereby certify that I am the sole Partner, Member or
(Name)

Manager and the sole officer of JBC Construction LLC a limited liability partnership
(Name of Partnership or LLC)

under RSA 304-B, a limited liability professional partnership under RSA 304-D, or a limited liability company under RSA 304-C.

I certify that I am authorized to bind the partnership or LLC. I further certify that it is understood that the State of New Hampshire will rely on this certificate as evidence that the person listed above currently occupies the position indicated and that they have full authority to bind the partnership or LLC and that this authorization shall remain valid for thirty (30) days from the date of this Corporate Resolution:

DATED: May 12, 2021

ATTEST:

Dan Callahan-Member
(Dan Callahan-Member)



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
05/12/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER FIA/Cross Insurance 1100 Elm Street Manchester NH 03101		CONTACT NAME: Heather M. Sommers, API PHONE (AC No. Ext): (803) 669-3218 FAX (AC No.): (803) 645-4331 E-MAIL ADDRESS: hsommers@crossagency.com	
INSURED JBC Construction LLC PO Box 107 Londonderry NH 03053		INSURER(S) AFFORDING COVERAGE	
		INSURER A: Ohio Security Ins Co	NAIC # 24082
		INSURER B: Concord General Mutual Ins Co	20872
		INSURER C: LM Insurance Corp	
		INSURER D:	
		INSURER E:	
		INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** 20/21 GL & WC, 21/22 BA **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDITIONAL INSURER RISK	WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			BKS58953248	07/13/2020	07/13/2021	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 300,000 MED EXP (Any one person) \$ 15,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMPROP AGG \$ 2,000,000 \$
B	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input checked="" type="checkbox"/> OWNED AUTOS ONLY <input checked="" type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY			20028059	02/07/2021	02/07/2022	COMBINED SINGLE LIMIT (Ea accident) \$ 500,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	<input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below Y/N N/A <input checked="" type="checkbox"/> Y			WC5315619463020 (3a) NH	07/14/2020	07/14/2021	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000
	Daniel Callahan is excluded from Workers Compensation						

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Work to be performed at the DMAVS Latrines Project 4 Pembroke Rd., Building C, Concord, N.H. 03301. Department of Military Affairs and Veteran's Services is included as additional insured with respects to CGL as required by written contract with named insured.

CERTIFICATE HOLDER Department of Military Affairs and Veteran's Services 4 Pembroke Road Concord NH 03301	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE <i>Heather M. Sommers</i>
---	---



AIA Document A312™ - 2010

Performance Bond

Bond Number: BND1006481-00

CONTRACTOR:

(Name, legal status and address)

JBC Construction, LLC
P.O. Box 107
Londonderry, NH 03053

OWNER:

(Name, legal status and address)

State of New Hampshire, Department
Military Affairs and Veteran's Services
4 Pembroke RD C Concord NH 03301
CONSTRUCTION CONTRACT
Date: 05/12/2021

Amount: \$180,630.00

Description:

(Name and location)

SMR, BLDG C Latrines Project

BOND

Date: 05/19/2021

(Not earlier than Construction Contract Date)

Amount: \$180,630.00

Modifications to this Bond: None See Section 16

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

JBC Construction, LLC

Signature: *[Signature]*

Name: **DAVID CALLAHAN**

and Title: **MEMBER**

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

SURETY

Company: *(Corporate Seal)*

Fair American Insurance and Reinsurance Company

Signature: *[Signature]*

Name: **David R. Brett, Attorney In Fact**

and Title: **David R. Brett, Attorney In Fact**

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party.)

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

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

AIA Document A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
2. additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

SURETY

Company:

(Corporate Seal)

Company:

(Corporate Seal)

Signature: _____

Name and Title:

Address

Signature: _____

Name and Title:

Address

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



AIA Document A312™ - 2010

Payment Bond

Bond Number: BND1006481-00

CONTRACTOR:

(Name, legal status and address)

JBC Construction, LLC

P.O. Box 107

Londonderry, NH 03053

OWNER:

(Name, legal status and address)

State of New Hampshire, Department

Military Affairs and Veteran's Services

4 Pembroke RD C Concord NH 03301

CONSTRUCTION CONTRACT

Date: 05/12/2021

Amount: \$180,630.00

Description:

(Name and location)

SMR, BLDG C Latrines Project

BOND

Date: 05/19/2021

(Not earlier than Construction Contract Date)

Amount: \$180,630.00

Modifications to this Bond: None See Section 18

CONTRACTOR AS PRINCIPAL

Company: *(Corporate Seal)*

JBC Construction, LLC

Signature: *[Signature]*

Name: **DAVE CALLAHAN**

Title: **MEMBER**

(Any additional signatures appear on the last page of this Payment Bond.)

SURETY

Company: *(Corporate Seal)*

Fair American Insurance and Reinsurance Company

Signature: *[Signature]*

Name: **David R. Brett, Attorney In Fact**

Title:

(FOR INFORMATION ONLY - Name, address and telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party.)

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

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

AIA Document A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- 1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- 2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL
Company:

(Corporate Seal)

SURETY
Company:

(Corporate Seal)

Signature: _____
Name and Title:
Address:

Signature: _____
Name and Title:
Address:

CAUTION: You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

FAIR AMERICAN INSURANCE AND REINSURANCE COMPANY

One Liberty Plaza, 100 Broadway, New York, NY 10006

POWER OF ATTORNEY

That the undersigned, President, that Fair American Insurance and Reinsurance Company ("Company"), a New York corporation, has made, constituted and appointed, and by these presents does make, constitute and appoint, Andrew C. Heizer of Atlanta, Georgia; Stefan E. Tauder of Fort Collins, Colorado; Arthur S. Johnson of Atlanta, Georgia; James E. Felner of West Lake, Ohio; Jeffrey L. Booth of Blaine, Ohio; Mercedes Sanchez of Atlanta, Georgia; David R. Grett of Columbia, South Carolina; Scott E. Spilner of Birmingham, Alabama; Jason S. Campbell of Knoxville, Florida; Matthew G. Hollinger of Savannah, Georgia; Nicholas C. Brown of Columbus, Georgia; Thomas D. Johnson of Atlanta, Georgia; Ontario S. Givens of Grand Prairie, Kansas; or Douglas Bernhardt of Jacksonville, Florida, EACH as its true and lawful attorney-in-fact to sign, execute, seal, deliver for, and on behalf of the said Company, and as its act and deed any check in the United States any and all such, bonds, undertakings, responsibilities and contracts of any nature to be given to or received by any person or entity, and any other instrument, and to execute, seal, deliver for, and on behalf of the said Company, any and all such contracts, provided that no such contract shall be entered into or any such instrument shall be executed on behalf of the said Company for the sum of \$500,000 (Five Hundred Thousand Dollars) or any multiple thereof, and that, however, that the undersigned, attorney-in-fact, whose name is set forth herein, and they shall have no authority to bind the Company except in the manner stated and to the extent of any limitation herein.



This Power of Attorney is granted and is entered into and executed in full under and by the authority of the following Resolutions adopted hereunto and hereunder by the Board of Directors of the Company on the 25th day of January, 2021:

RESOLVED that the President, Chairman, or any Senior Vice President or Vice President of the Company, in conjunction with any Senior Vice President or Vice President, be, and that each of any of them hereby is, authorized to appoint Attorneys-in-fact for the Company as may be necessary to carry out the Company's business, execute, seal, deliver for, and deliver any and all such contracts, undertakings, responsibilities, contracts of any nature, or other instruments, and to execute, seal, deliver for, and on behalf of the Company, any and all such contracts, provided that no such contract shall be entered into or any such instrument shall be executed on behalf of the said Company for the sum of \$500,000 (Five Hundred Thousand Dollars) or any multiple thereof, and that, however, that the undersigned, attorney-in-fact, whose name is set forth herein, and they shall have no authority to bind the Company except in the manner stated and to the extent of any limitation herein.

WHEREFORE, the undersigned, President, Chairman, or any Senior Vice President or Vice President of the Company, in conjunction with any Senior Vice President or Vice President, do hereby certify that the above named Senior Vice President, personally appeared, with knowledge of the facts, and acknowledged to me that they executed the same in their authorized capacities, that they know the seal of Fair American Insurance and Reinsurance Company, and that their signatures and the seal of Fair American Insurance and Reinsurance Company, as set forth above and as set forth in the attached Power of Attorney, are true and correct, and that the said Senior Vice President, personally appeared, with knowledge of the facts, and acknowledged to me that they executed the same in their authorized capacities, that they know the seal of Fair American Insurance and Reinsurance Company, and that their signatures and the seal of Fair American Insurance and Reinsurance Company, as set forth above and as set forth in the attached Power of Attorney, are true and correct.


IN WITNESS WHEREOF, the Company has caused its official seal to be hereto affixed, and these presents to be signed with its corporate seal and duly attested to by three Senior Vice Presidents the 7th day of January, 2021.

Fair American Insurance and Reinsurance Company

By: 
Christopher O'Gwen, Senior Vice President
By: 
Suzanne R. Spilner, Senior Vice President

STATE OF NEW YORK
COUNTY OF NEW YORK

On January 07, 2021, before me the undersigned, Senior Vice President, personally appeared, with knowledge of the facts, and acknowledged to me that they executed the same in their authorized capacities, that they know the seal of Fair American Insurance and Reinsurance Company, and that their signatures and the seal of Fair American Insurance and Reinsurance Company, as set forth above and as set forth in the attached Power of Attorney, are true and correct, and that the said Senior Vice President, personally appeared, with knowledge of the facts, and acknowledged to me that they executed the same in their authorized capacities, that they know the seal of Fair American Insurance and Reinsurance Company, and that their signatures and the seal of Fair American Insurance and Reinsurance Company, as set forth above and as set forth in the attached Power of Attorney, are true and correct.

IN WITNESS WHEREOF, I have hereunto set my hand and the seal of my office, this 7th day of January, 2021.
Signature:  (Seal)

That the undersigned, Christopher O'Gwen, Vice President of Fair American Insurance and Reinsurance Company, a New York corporation, do hereby certify that the Power of Attorney attached hereto is a true and correct copy of the original Power of Attorney, and that the said Power of Attorney is true and correct, and that the said Power of Attorney is in full force and effect.

Signed and sealed before me this 7th day of January, 2021.


Christopher O'Gwen, Senior Vice President

From: DAS: PRCHWEB
To: Godin, Ryan
Subject: RE: Can you please post this RFB.
Date: Wednesday, April 21, 2021 2:10:56 PM
Attachments: RFB DMAVS 2021-03.pdf

Hi Ryan,
All set! Thanks for numbering the attachments!

Your RF(X) request has been posted to our website.
<https://das.nh.gov/purchasing/bidscontracts/bids.aspx>

Please contact us with any amendments or any changes to this posting.

Corrine E Tatro

Corrine E Tatro, Purchasing Assistant
State of NH, Dept of Administrative Services
Bureau of Purchase and Property
State House Annex RM 102
25 Capitol Street, Concord, NH 03301
PH: 603-271-4308
Fax: 603-271-2700

Prch.web@das.nh.gov

From: Godin, Ryan <Ryan.M.Godin@DMAVS.nh.gov>
Sent: Wednesday, April 21, 2021 12:19 PM
To: DAS: PRCHWEB <PRCH.WEB@das.nh.gov>
Subject: Can you please post this RFB.

Good afternoon Purchasing,

Can you please post the attached RFB with attachments before the end of the day.

Here is the RFB schedule:

04/21/2021 Bid Solicitation distributed by 4:00 PM EST

04/27/2021 Non-mandatory Walk Thru, 8:00 AM

04/30/2021 Last day for questions, clarifications, and/or requested changes to bid, 10:00 AM

05/05/2021 Agency posts responses to Vendors' questions, 10:00 AM

Department of Administrative Services
Procurement and Support Services | Statewide Bids and Proposals



View Contracts

BIDS are currently available for Download via PDF format and Require Adobe Acrobat Reader 5.0 or higher) go to the [Bids/Proposals Document Form](#) (PDF Readers) page for assistance in obtaining the Adobe Acrobat Free Reader.

Click the Bid # to view the bid details.

Click the contact name to email the contact.

Bid Results are currently available for Download when they have been awarded.

Please click the "Awarded Bid" link under the "Status/Bid Results" column to view the bid results.

Submitting A Bid

Search by Bid#:

Use any one or combination of these search options to search for contracts by:

Bid description contains:

Status/Bid Results:

Closing Between:

Start: End:

Contact:

Commodity Category contains:

✚ Indicates a NH Economic Stimulus Project

Export to Excel

Bids are sorted by posted date most current to least current. Click column heading links to change the sort order.

Description	Bid #	Attachments	Addendum	Closing Date	Closing Time	Status/Bid Results	Contact	Commodity Category
CONTRACT: Janitorial Cleaning Services	Bid 2419-21	Attachment 1 Attachment 2	Addendum 1	5/7/2021	3:00PM	Open	Haley, Jeffrey	BUILDING MAINTENANCE, INSTALLATION AND REPAIR SERVICES
SNR, Bldg C Latrines Project	RFB DNCR 2021-03	Attachment 1 Attachment 2 Attachment 3 Attachment 4 Attachment 5 Attachment 6		5/10/2021	10:00AM	Open	Godin, Ryan	MISCELLANEOUS SERVICES, No 1 (NOT OTHERWISE CLASSIFIED)
Elevator Maintenance and Repair Services	Bid 2454-21	Attachment 1		5/11/2021	10:00AM	Open	Brisson, Erica	BUILDING MAINTENANCE, INSTALLATION AND REPAIR SERVICES
HVAC Preventative Maintenance and Repair Services	Bid 2453-21			5/12/2021	10:00AM	Open	Brisson, Erica	Equip MAINT, REPAIR, AND RELATED SERVICES FOR POW GENERATION AND TRANSMISSION Equip
Elacoya State Park, RV Park Bathhouse Renovation Project: CAP 2018	RFB DNCR 2021-04	Attachment 1 Attachment 2 Attachment 3 Attachment 4 Attachment 5		5/18/2021	2:00PM	Open	Conroy, Scott	CONSTRUCTION SERVICES, TRADE (NEW CONSTRUCTIO
Truck Tire Retreading Services	Bid 2453-21			5/19/2021	10:00AM	Open	Brisson, Erica	Equip MAINTENANCE AND REPAIR SERVICES FOR AUTOMOBILES, TRUCKS, TRAILERS, TRANSIT BUSES AND OTHER VEHICLES

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A NEW WAY TO SIGN IN - If you already have a SAM account, use your SAM email for login.gov. [Log In](#)

[Login.gov FAQs](#)

- ⚠ ALERT: SAM.gov will be completely unavailable due to scheduled maintenance from Friday, May 21 at 4:00 PM EST through Monday, May 24 at 9:00 AM EST as it is upgraded to the modernized environment. [Learn more](#).
- ⚠ ALERT: Small business owners who seek to participate in the Restaurant Revitalization Fund (RRF) will not be required to have a DUNS Number, will not need to register in SAM.gov, and will not need a CAGE Code. SBA will share more information on the RRF soon. Visit [SBA](#) to stay informed.
- ⚠ ALERT: Each entity registration expiring between April 1 and September 30, 2021 will have an additional 180 days added to its expiration date. Read more about the extension on [Interact](#).
- ⚠ ALERT: SAM.gov will be down for scheduled maintenance Saturday, 05/15/2021 from 8:00 AM to 1:00 PM.
- ⚠ ALERT: Shuttered Venue Operators Grant (SVOG) Applicants - Applicants for relief under the SVOG program are required to register in SAM.gov. If you have submitted your SAM.gov registration, but the registration is not yet active, you can still apply for relief under the SVOG program. During the SVOG application process, you will have to attest that you have submitted your SAM.gov registration. To stay informed, please visit [SBA](#).

Search Results

Current Search Terms: JBC Construction LLC.*

Debarment

Total records:0

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Result Page:

Sort by [Relevance](#) | Order by [Descending](#)

Your search for JBC Construction LLC.* returned the following results...

No records found.

Result Page:

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This is a U.S. General Services Administration Federal Government computer system that is "FOR OFFICIAL USE ONLY." This system is subject to monitoring. Individuals found performing unauthorized activities are subject to disciplinary action including criminal prosecution.

Department of Military Affairs and Veteran Services Bid Transmittal Letter

Date: _____

Company Name: _____

Address: _____

To: Point of Contact: Ryan Godin

Telephone: (603)-227-5094

Email: Ryan.Godin@nh.gov

RE: Bid Invitation Name: SMR, BLDG C Latrines Project

Bid Number: RFB DMAVS 2021-03

Bid Posted Date (on or by): 04/21/21

Bid Closing Date and Time: 05/10/21 @ 10:00 AM (EST)

Dear Vendors:

[Insert name of signor] _____, on behalf of _____
[insert name of entity submitting bid (collectively referred to as "Vendor") hereby submits an offer as contained in the written bid submitted herewith ("Bid") to the State of New Hampshire in response to BID # RFB DMAVS 2021-03 for SMR, BLDG C Latrines Project at the price(s) quoted herein in complete accordance with the bid.

Vendor attests to the fact that:

1. The Vendor has reviewed and agreed to be bound by the Bid.
2. The Vendor has not altered any of the language or other provisions contained in the Bid document.
3. The Bid is effective for a period of 180 days from the Bid Closing date as indicated above.
4. The prices Vendor has quoted in the Bid were established without collusion with other vendors.
5. The Vendor has read and fully understands this Bid.
6. Further, in accordance with RSA 21-I:11-c, the undersigned Vendor certifies that neither the Vendor nor any of its subsidiaries, affiliates or principal officers (principal officers refers to individuals with management responsibility for the entity or association):
 - a. Has, within the past 2 years, been convicted of, or pleaded guilty to, a violation of RSA 356:2, RSA 356:4, or any state or federal law or county or municipal ordinance prohibiting specified bidding practices, or involving antitrust violations, which has not been annulled;
 - b. Has been prohibited, either permanently or temporarily, from participating in any public works project pursuant to RSA 638:20;
 - c. Has previously provided false, deceptive, or fraudulent information on a vendor code number application form, or any other document submitted to the state of New Hampshire, which information was not corrected as of the time of the filing a bid, proposal, or quotation;

- d. Is currently debarred from performing work on any project of the federal government or the government of any state;
- e. Has, within the past 2 years, failed to cure a default on any contract with the federal government or the government of any state;
- f. Is presently subject to any order of the department of labor, the department of employment security, or any other state department, agency, board, or commission, finding that the applicant is not in compliance with the requirements of the laws or rules that the department, agency, board, or commission is charged with implementing;
- g. Is presently subject to any sanction or penalty finally issued by the department of labor, the department of employment security, or any other state department, agency, board, or commission, which sanction or penalty has not been fully discharged or fulfilled;
- h. Is currently serving a sentence or is subject to a continuing or unfulfilled penalty for any crime or violation noted in this section;
- i. Has failed or neglected to advise the division of any conviction, plea of guilty, or finding relative to any crime or violation noted in this section, or of any debarment, within 30 days of such conviction, plea, finding, or debarment; or
- j. Has been placed on the debarred parties list described in RSA 21-I:11-c within the past year.

Authorized Signor's Signature _____ Authorized Signor's Title _____

NOTARY PUBLIC/JUSTICE OF THE PEACE

COUNTY: _____ STATE: _____ ZIP: _____

On the ____ day of _____, 2021, personally appeared before me, the above named _____, in his/her capacity as authorized representative of _____, known to me or satisfactorily proven, and took oath that the foregoing is true and accurate to the best of his/her knowledge and belief.

In witness thereof, I hereunto set my hand and official seal.

 (Notary Public/Justice of the Peace)

My commission expires: _____ (Date)

REQUEST FOR BID (RFB) FOR SMR, BLDG C LATRINES PROJECT
THE DEPARTMENT OF MILITARY AFFAIRS AND VETERAN SERVICES

PURPOSE:

The purpose of this bid invitation is to establish a contract for a SMR, BLDG C Latrines Project to the Department of Military Affairs and Veteran Services with services indicated in the SCOPE OF SERVICES and OFFER sections of this bid invitation, in accordance with the requirements of this bid invitation and any resulting contract.

1. INSTRUCTIONS TO VENDOR:

Read the entire bid invitation prior to filling it out. Complete the Bid Form in the "Offer" section (detailed information on how to fill out the pricing information can be found in the "Offer" section); complete the "Vendor Contact Information" section; and finally, fill out, sign, and notarize pages one and two of the bid invitation.

2. DEFINITIONS:

- a. The term "**Consultant**" means the registered Professional Architect or Engineer engaged to develop Plans and Specifications for the Project.
- b. The term "**Department**" means The Department of Military Affairs and Veterans Services acting directly or through an authorized representative.
- c. The term "**Contractor**" means the party of the second part to the Contract, acting directly or through an authorized lawful agent or employee. The Specifications may be divided into separate headings or divisions to cover various trades in the work, and where trade Contractors are referred to, it has been for convenience only.
- d. The terms "**Plans**" and "**Drawings**" shall be synonymous.
- e. The term "**provide**" means to furnish and install a product, materials, systems, and/or equipment, complete in place, fully tested and approved.
- f. Wherever the term "**Architect**" is used throughout the Technical Specifications, it shall be understood to mean the "Consultant".
- g. The term "**Notice**" as used herein shall mean and include all written notices, demands, instructions, claims, approvals, and disapprovals required to obtain compliance with Contract requirements. Any written notice by either party to the Contract shall be sufficiently given if delivered to or at the last known business address of the person, firm, or corporation constituting the other party to the Contract, or to his, their, or its duly authorized agent, representative, or officer, or when sent by registered mail to such last known business address.

3. BID SUBMITTAL:

All bids shall be submitted on this form (or an exact copy), shall be typed or clearly printed in ink, and shall be received on or before the date and time specified on page 1 of this bid under "Bid Closing". Bids must be submitted in a sealed envelope. Interested parties may submit a bid to the Department of Military Affairs and Veteran Services by email to Ryan.M.Godin@DMAVS.nh.gov. All bids shall be clearly marked with bid number, date due and Agency contact's name.

- a. The Bidder is required to bid on all items called for in the proposal, which may include Alternates. For Alternate pricing the Bidder shall set forth in the space provided the amount to be added to or deducted from the Base Bid. If an alternate price called for does not involve a change in price, the Bidder shall so indicate by writing the words "no change" in the space provided.
- b. The Bidder shall specify a unit price, both in words and figures, for each item called for in this Proposal. All of the words and figures shall be in ink or typed. If a unit price or a lump sum already entered by the Bidder on the Bid Form is to be altered, it should be crossed out with ink, the new unit price or lump sum bid entered above or below it and initialed by the Bidder: also in ink. In case of discrepancy between the prices written in words and those written in figures, the prices written in words shall govern. Bids containing any conditions, omissions, unexplained erasures or alterations, or items not called for in the Proposal or irregularities of any kind may be rejected by the Department as being incomplete.
- c. Bids may be submitted electronically to the Procurement Technician. If the selected bidder submits electronically, the original documents will be required to be submitted to the department.
 - i. In the event of discrepancies between the electronic and physical submission, the physical submission shall control.
- d. Each bid must contain the full business address of the Bidder and be signed with a legally defining signature. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership named by one of the members of the partnership or by an authorized representative, followed by the designation of the person signing. Bids by corporation must be signed with the legal name of the corporation, followed by the name of the State of incorporation and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. The name of each person signing shall also be typed or printed below the signature. A bid by a person who affixes to his signature, the word "President," "Secretary," "Agent" or other designation, without disclosing his principal, may be held to the bid of the individual signing. When requested by the Department, satisfactory evidence of the authority of the officer signing on behalf of the corporation shall be furnished.
- e. Proposals submitted by U.S. Mail, Delivery Service or In Person must be addressed to:

State of New Hampshire
Department of Military Affairs and Veterans Services
c/o
State Business Office

- f. Proposals submitted electronically should be emailed to:

Ryan.M.Godin@DMAVS.nh.gov

If you experience difficulties emailing your Bid, or you wish to verify that your bid response has been received, Please Call (603) 227-5094.

4. BID INQUIRIES:

Any questions, clarifications, and/or requested changes shall be submitted by an individual authorized to commit their organization to the Terms and Conditions of this bid and shall be received in writing at the Department of Military Affairs and Veteran Services by the time and date as specified in the timeline below. Questions shall not be submitted to anyone other than the Department of Military Affairs and Veteran Services representative identified below. Bidders that submit questions verbally or in writing to any other State entity,

NH National Guard entity, State personnel or NH National Guard personnel shall be found in violation of this part and may be found non-compliant.

Questions shall be submitted by E-mail to Andrew Nash, Engineering Technician at the following address:
Andrew.nash1.nfg@mail.mil

Vendor shall include complete contact information including the vendor's name, contact name, telephone number, fax number and email address.

Submissions shall clearly identify the bid Number, the Vendor's name and address and the name of the person submitting the question.

5. WITHDRAWAL OF BIDS:

Bids may be withdrawn upon written request received from Bidders prior to the time fixed for opening. Negligence on the part of the Bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

6. BID DUE DATE:

All bid submissions shall be received at the Department of Military Affairs and Veteran Services no later than the date and time shown on the transmittal letter of this RFB. Submissions received after the date and time specified shall be marked as "Late" and shall not be considered in the evaluation process.

All offers shall remain valid for a period of one hundred eighty (180) days from the bid due date. A vendor's disclosure or distribution of bids other than to the Department of Military Affairs and Veteran Services may be grounds for disqualification.

7. SUBSTITUTIONS:

Where the bidding documents stipulate particular products, substitution requests will ONLY be considered before receipt of bids.

8. ADDENDA:

In the event it becomes necessary to add to or revise any part of this RFB prior to the scheduled submittal date, the Department of Military Affairs and Veteran Services shall post on its web site any Addenda. Before submission and periodically prior to the RFB closing, Vendors are required to check the site for any addenda or other materials that may have been issued affecting the bid. The web site address is <https://apps.das.nh.gov/bidscontracts/>.

9. TIMELINE:

The timeline below is provided as a general guideline and is subject to change. Unless stated otherwise, consider the dates on the following page “no later than” dates.

04/21/2021	Bid Solicitation distributed by 4:00 PM EST
04/27/2021	Non-mandatory Walk Thru, 8:00 AM
04/30/2021	Last day for questions, clarifications, and/or requested changes to bid, 10:00 AM
05/05/2021	Agency posts responses to Vendors’ questions, 10:00 AM
05/10/2021	10:00 AM (EST) Bid Closing

10. TERMS OF SUBMISSION:

All material received in response to this bid shall become the property of the State and shall not be returned to the Vendor. Regardless of the Vendors selected, the State reserves the right to use any information presented in a bid response. The content of each Vendor’s bid shall become public information once a contract(s) has been awarded.

A responding bid that has been completed and signed by your representative shall constitute your company’s acceptance of all State of New Hampshire terms and conditions and shall legally obligate your company to these terms and conditions.

A signed response further signifies that from the time the RFB is published (bid solicitation date and time) until a contract is awarded, no bidder shall offer or give, directly or indirectly, any gift, expense reimbursement, or honorarium, as defined by RSA 15-B, to any elected official, public official, public employee, constitutional official, or family member of any such official or employee who shall select, evaluate, or award the RFB.

Furthermore, a signed response signifies that any terms and/or conditions that may be or have been submitted by the Vendor in the bid are specifically null and void and are not a part of this bid invitation or any awarded purchase order, even if said terms and/or conditions contain language to the contrary.

The form P-37 Contract attached hereto shall be part of this bid and the basis for the contract(s). The successful Vendor and the State, following notification, shall promptly execute this contract form, which is to be completed by incorporating the service requirements and price conditions established by the vendor’s offer.

Complete bids shall be filled out on the original documents and format that are a part of this bid invitation. Vendors may submit additional paperwork with pricing, but all pricing shall be on the documents provided with this bid invitation and in the State’s format.

11. CONTRACT TERM:

The term of the contract shall commence upon approval of the Governor and Executive Council, whichever is later, through March 31, 2022.

12. CONTRACT SECURITY:

The successful Bidder, at the time of the execution of the Contract, must deposit with the Department Surety in the sum equal to one hundred percent (100%) of the amount of the Contract as required by RSA 447:16. The form of Bond shall be that provided for by the Department and the Surety shall be acceptable to the Department. The Contract Bond must be written by a Company licensed to do business in New Hampshire at the time the policy is issued. In addition, the Company issuing the bond shall be listed on the current list of "Surety Companies Acceptable on Federal Bonds" as published by the Treasury, Financial Management Services, and Circular Number 570.

13. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE:

The contractor shall deliver to the Department at the time of execution of the Contract, certificates of all insurance required hereunder and such insurance shall be reviewed prior to approval by the Attorney General. The certificates of insurance shall contain the description of the Project, and shall state that the companies issuing insurance will mail to the Department ten (10) days notice of cancellation, alteration of material change of any listed policies. The Contractor shall keep in force the insurance required herein for the period of the Contract. At the request of the Department, the Contractor shall promptly make available a copy of any and all listed insurance policies. The required insurance must be written by a Company licensed to do business in the State of New Hampshire at the time the policy is issued. In addition, the company must have a rating of no less than B+ based on the current A.M. best rating guide.

The Contractor shall require each Subcontractor employed on the Project to maintain the coverage listed below unless the Contractor's insurance covers activities of the Subcontractor on the Project.

No operations under this Contract shall commence until certificates of insurance attesting to the below listed minimum requirements have been filed with the Department, approved by the Attorney General, and the Contract approved by the Governor and Council.

- a. Workers' Compensation in accordance with the State of New Hampshire statutory requirements.
 - i. Employer's Liability:
 - \$100,000 Each Accident
 - \$500,000 Disease-policy limits;
 - \$100,000 Disease- each employee
- b. Commercial General Liability;
 - i. Occurrence Form, to include Contractual Liability (see Indemnification Clause), Explosion, Collapse, and Underground coverages.
 - Limits of Liability:
 - \$1,000,000 Each Occurrence Bodily Injury & Property Damage;
 - \$2,000,000 General Aggregate – Include Per Project Aggregate Endorsement
 - \$2,000,000 Products/Completed Operations Aggregate

OR

- c. Commercial General Liability Form; to include Premises/Operations, Independent Contractors, Products/Completed Operations, Personal Injury, Contractual Liability (see Indemnification Clause 11). Collapse and Underground, Medical Payment coverage's (Broad Form Comprehensive GL Endorsement)
 - Limits of Liability:
 - \$1,000,000 Combined Single Limit of Liability for Bodily Injury & Property Damage
- d. NOTE: If blasting and/or demolition are required by the Contract, the Contractor or subcontractor shall obtain the respective coverage and shall furnish to the Department a Certificate of Insurance evidencing the required coverages prior to commencement of any operations involving blasting and/or demolition.
- e. Owner's Protective Liability coverage for the benefit of the Department of Military Affairs and Veteran's Services.
 - Limits of Liability:
 - \$1,000,000 Combined
 - \$1,000,000 Aggregate
- f. Commercial Automobile Liability covering all motor vehicles including owned, hired, borrowed, and non-owned vehicles.
 - Limits of Liability:
 - \$1,000,000 Combined Single Limit for Bodily Injury & Property Damage.
- g. Commercial Umbrella Liability
 - Limits of Liability:
 - \$1,000,000 Each occurrence
 - \$1,000,000 Aggregate
- h. Builder's Risk Insurance (Fire and Extended Coverage):
 - The Contractor shall insure the work included in the Contract on an "All Risk" basis, on one hundred percent (100%) completed value basis of the contract. Builder's Risk coverage shall include materials located on-site, in-transit, and at any temporary site. The policy by its own terms or by endorsement shall specifically permit partial or beneficiary occupancy prior to completion or acceptance of the entire work. The policies shall be in the names of the State Agency and the Contractor. The policies shall provide for the inclusion of the names of all other Contractors, Subcontractors, and others employed on the premises as insureds. The policies shall stipulate that the insurance companies shall have no right of subrogation against any Contractors. Subcontractors or other parties employed on the premises.
- i. Indemnification:
 - The Contractor shall indemnify, defend, and save harmless the State of New Hampshire and its agents and employees from and against any and all claims, liabilities, suits or penalties arising out of (or which may be claimed to arise out of) acts or omissions of the Contractor or-subcontractors in the performance of work covered by the contract. This covenant shall survive the termination of the contract. Notwithstanding, the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the State, which immunity is hereby reserved by the State.

14. CONTRACT AWARD:

The award shall be made to the Vendor(s) meeting the criteria established in this RFB and providing the lowest total bid on the bid form. The State reserves the right to reject any or all bids or any part thereof and add/delete items/locations to the contract. All award(s) shall be, in the form of a State of New Hampshire Contract(s).

Successful Vendor shall not be allowed to require any other type of order, nor shall the successful Vendor be allowed to require the filling out or signing of any other document by State of New Hampshire personnel.

15. NON-COMMITMENT:

Notwithstanding any other provision of this RFB, this RFB does not commit the Agency to award a contract. The Agency reserves the right, at its sole discretion, to reject any and all Proposals, or any portions thereof, at any time; to cancel this RFB; and to solicit new Bids under a new acquisition process.

Funds to support the anticipated contract are provided by the Federal Government and administered under an existing Federal-State Agreement. Under the Agreement, the State of New Hampshire – Department of Military Affairs and Veterans Services provides these services and the Federal Government reimburses the State for the costs related to the services at the rate of 100%. In the event that Federal Funds are not available for this contract, the contract will not be awarded.

16. NON-EXCLUSIVE CONTRACT:

Any resulting Contract from this RFB will be a non-exclusive Contract. The State reserves the right, at its discretion, to retain other Contractors to provide any of the Services or Deliverables identified under this Bid or make an award by item, part or portion of an item, group of items, or total Proposal.

17. NOTIFICATION AND AWARD OF CONTRACT(S):

On the closing date for bids, the Department will hold a public bid opening. For Vendors wishing to attend the public bid opening, the names of the vendors submitting responses and pricing shall be made public. Bid results shall not be given by telephone. Other specific response information shall not be given out. Bid results shall be made public after final approval of the contract(s).

Bid results may also be viewed on the State of New Hampshire Purchase and Property website.

18. LIABILITY:

The State shall not be held liable for any costs incurred by Vendors in the preparation of bids or for work performed prior to contract issuance.

19. PUBLIC DISCLOSURE OF BID OR PROPOSAL SUBMISSIONS:

Generally, the full contents of any bid or proposal (including all materials submitted in connection with it, such as attachments, exhibits, addenda, and vendor presentations) become public information upon completion of final contract with the selected vendor. Certain information concerning bids or proposals, including but not limited to pricing or scoring, is generally available to the public even before this time, in accordance with the provisions of NH RSA 21-G: 37.

Information submitted in response to this RFB is subject to public disclosure To the extent consistent with under applicable state and federal laws and regulations, as determined by the State, including, but not limited to, NH RSA Chapter 91-A (the "Right-to-Know" Law), after the award of a contract by G&C. At the time of closing date for bid responses, the Department will hold a public bid opening at which it shall disclose the name of the bidders which submitted timely bids and the prices offered. Notwithstanding the Right-to-Know law, no

information concerning the contracting process, including, but not limited to information related to bids, communications between the parties or contract negotiations, shall be available until a contract is approved by G&C, or, if the contract does not require G&C approval, until the contract has been actually awarded., the State shall, after final negotiations with the selected vendor are complete, attempt to maintain the confidentiality of portions of a bid or proposal that are clearly and properly marked by a bidder as confidential. Any and all information contained in or connected to a bid or proposal that a bidder considers confidential shall be clearly designated in the following manner:

If the bidder considers any portion of a submission confidential, they shall provide a separate copy of the full and complete document, fully redacting those portions by blacking them out and shall note on the applicable page or pages of the document that the redacted portion or portions are "confidential." Use of any other term or method, such as stating that a document or portion thereof is "proprietary", "not for public use", or "for client's use only", is not acceptable. In addition to providing an additional fully redacted copy of the bid submission to the person listed as the point of contact on Page one (1) of this document, the identified information considered to be confidential must be accompanied by a separate letter stating the rationale for each item designated as confidential. In other words, the letter must specifically state why and under what legal authority each redaction has been made. Submissions which do not conform to these instructions by failing to include a redacted copy (if required), by failing to include a letter specifying the rationale for each redaction, by failing to designate redactions in the manner required by these instructions, or by including redactions which are contrary to these instructions or operative law may be rejected by the State as not conforming to the requirements of the bid or proposal. The State will generally assume that a bid or proposal submitted without an additional redacted copy contains no information which the bidder deems confidential. Bids and proposals which contain no redactions, as well as redacted versions of submissions that have been accepted by the State, may be released to the public, including by means of posting on State web sites.

The State shall have no obligation to maintain the confidentiality of any portion of a bid, proposal or related material, which is not marked in accordance with the foregoing provisions. It is specifically understood and agreed that the bidder waives any claim of confidentiality as to any portion of a response to this RFB or RFP that is not marked as indicated above, and that unmarked (or improperly marked) submissions may be disseminated to any person, without limitation. Marking an entire bid, proposal, attachment or full sections thereof confidential without taking into consideration the public's right to know shall neither be accepted nor honored by the State.

Notwithstanding any provision of this request for submission to the contrary, proposed pricing shall be subject to public disclosure REGARDLESS of whether or not marked as confidential.

Notwithstanding a Vendor's designations, the State is obligated under the Right-to-Know law to conduct an independent analysis of the confidentiality of the information submitted in a bid proposal. If a request is made to the State by any person or entity to view or receive copies of any portion of the proposal, the State shall first assess what information it is obligated to release. The State will then notify you that a request has been made, indicate what, if any, information the State has assessed is confidential and will not be released, and specify the planned release date of the remaining portions of the proposal. To halt the release of information by the State, a Vendor must initiate and provide to the State, prior to the date specified in the notice, a court action in the Superior Court of the State of New Hampshire, at its sole expense, seeking to enjoin the release of the requested information. By submitting a bid or proposal, the bidder agrees that unless it obtains and provides to the State, prior to the date specified in the notice described in the paragraph above, a court order valid and enforceable in the State of New Hampshire, at its sole expense, enjoining the release of the requested information, the State may release the information on the date specified in the notice without any liability to the bidder.

By submitting a proposal, Vendors acknowledge and agree that:

- The State may disclose any and all portions of the proposal or related materials which are not marked as confidential and/or which have not been specifically explained in the letter to the person identified as the point of contact for this RFP;
- The State is not obligated to comply with a Vendor's designations regarding confidentiality and must conduct an independent analysis to assess the confidentiality of the information submitted in your proposal; and
- The State may, unless otherwise prohibited by court order, release the information on the date specified in the notice described above without any liability to a Vendor.

Electronic Posting of Resulting Contract

RSA 91-A obligates disclosure of contracts resulting from responses to RFBs. As such, the Secretary of State provides to the public any document submitted to G&C for approval, and posts those documents, including the contract, on its website. Further, RSA 9-F:1 requires that contracts stemming from RFBs be posted online. By submitting a bid, Vendors acknowledge and agree that, in accordance with the above mentioned statutes and policies, (and regardless of whether any specific request is made to view any document relating to this RFB), any contract resulting from this RFB that is submitted to G&C for approval will be made accessible to the public online via the State's website.

20. VENDOR CERTIFICATIONS:

All Vendors shall be duly registered as a vendor authorized to conduct business in the State of New Hampshire.

STATE OF NEW HAMPSHIRE VENDOR APPLICATION: Prior to bid award, Vendors shall have a completed VENDOR CERTIFICATIONS:

All Vendors shall be duly registered with the State of New Hampshire as a vendor. All Vendors that are corporations, limited liability companies, or other limited liability business entities (this excludes sole proprietors and general partnerships) shall be duly registered with the New Hampshire Secretary of State to conduct business in the State of New Hampshire.

- **STATE OF NEW HAMPSHIRE VENDOR APPLICATION:** To be eligible for a contract award, a Vendor must have a completed Vendor Application Package on file with the NH Bureau of Purchase and Property. See the following website for information on obtaining and filing the required forms (no fee): <https://DAS.NH.Gov/Purchasing>
- **NEW HAMPSHIRE SECRETARY OF STATE REGISTRATION:** To be eligible for a contract award, a Vendor that is a corporation, limited liability company, or other limited liability business entity (this excludes sole proprietors and general partnerships) must be registered to conduct business in the State of New Hampshire AND in good standing with the NH Secretary of State. Please visit the following website to find out more about the requirements for registration with the NH Secretary of State: http://sos.nh.gov/Corp_Div.aspx
- **CONFIDENTIALITY & CRIMINAL RECORD:** If Applicable, any employee or approved subcontractor of the Vendor who will be accessing or working with records of the State of New Hampshire shall be required to sign a Confidentiality and Non-Disclosure Agreement and a Release of Criminal Record

Authorization Form. These forms shall be returned to the designated State agency prior to commencing any work.

• **CERTIFICATE OF INSURANCE:**

Prior to being awarded a contract the Vendor shall be required to submit proof of insurance in accordance with the outlined coverages in 12 CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE.

21. BID PRICES:

Bid prices shall remain firm for the entire contract period and shall be in US dollars and shall include delivery and all other costs required by this bid invitation. Special charges, surcharges (including credit card transaction fees), or fuel charges of any kind (by whatever name) may not be added on at any time. Any and all charges shall be built into your bid price at the time of the bid. Unless otherwise specified, prices shall be F.O.B. DESTINATION, (included in the price bid), which means delivered to a state agency's receiving dock or other designated point as specified in this contract or subsequent purchase orders without additional charge. Shipments shall be made in order to arrive at the destination at a satisfactory time for unloading during receiving hours.

Per Administrative Rule 606.01(e) "if there is a discrepancy between the unit price and the extension price in a response to an RFP, RFB or RFQ, the unit price shall be binding upon the vendor".

Price decreases shall become effective immediately as they become effective to the general trade or the Vendor's best/preferred customer

The selected contractor is to obtain and pay for all construction licenses, permits, and fees as may be required by law for construction of State's facility, and pay for all fees and charges, and use of the property other than the site of the work for storage of materials or other purposes.

The selected Contractor is to pay all applicable Federal, State, and Local sales and other taxes, except taxes, and assessments on the real property comprising the site of the Project.

22. AUDITS AND ACCOUNTING:

The successful Vendor shall allow representatives of the State of New Hampshire to have complete access to all records for the purpose of determining compliance with the terms and conditions of this bid invitation and in determining the award and for monitoring any resulting contract.

At intervals during the contract term, and prior to the termination of the contract, the successful Vendor may be required to provide a complete and accurate accounting of all products and quantities ordered by each agency and institution and by political sub-divisions and authorized non-profit organizations.

23. PAYMENT:

Payment method ACH. Payments shall be made via ACH unless otherwise specified by the state of New Hampshire. Use the following link to enroll with the State Treasury for ACH payments:
<https://www.nh.gov/treasury/state-vendors/index.htm>

24. INVOICING:

Invoices shall be submitted to the corresponding State agency in accordance with the Exhibit C Method of Payment.

25. TERMS OF PAYMENT:

Payment shall be made in full within thirty (30) days after receipt of the invoice and acceptance of the corresponding goods and/or services to the State's satisfaction.

26. VENDOR RESPONSIBILITY:

The successful Vendor shall be solely responsible for meeting all terms and conditions specified in the bid, and any resulting contract.

All State of New Hampshire bid invitations and addenda to these bid invitations are advertised on our website at: <https://das.nh.gov/Purchasing/vendorresources.aspx>.

It is a prospective Vendor's responsibility to access our VENDOR RESPONSIBILITY:

The successful Vendor shall be solely responsible for meeting all terms and conditions specified in the bid and any resulting contract.

All State of New Hampshire bid invitations and addenda to such bid invitations are advertised on our website at: <https://apps.das.nh.gov/bidscontracts/bids.aspx>.

It is a prospective Vendor's responsibility to access our website to determine any bid invitation under which the Vendor desires to participate. It is also the Vendor's responsibility to access our website for any posted addenda.

The website is updated several times per day; it is the responsibility of the prospective Vendor to access the website frequently to ensure that no bidding opportunity or addendum is overlooked.

It is the prospective Vendor's responsibility to forward a signed copy of any addendum requiring the Vendor's signature to the Department of Military Affairs and Veteran Services with the bid response.

In preparation of a bid response, the prospective Vendor shall:

- Provide pricing information as indicated in the "Offer" section; and ensure Bid form is filled out correctly with Numerical and Verbal. If numbers don't match the state is required to use Verbal Bid value as qualified bid price.
- Provide all other information required for the bid response (if applicable); and
- Complete the "Vendor Contact Information" section
- Add applicable prospective Vendor information to the "Transmittal Letter" form, and sign the form in the space provided. The Transmittal Letter form must be signed under oath and acknowledged by a notary public or justice of the peace in order for the bid response to be considered.

27. IF AWARDED A CONTRACT:

The successful Vendor shall complete the following sections of the attached Agreement State of New Hampshire Form #P-37:

Section 1.3 Contractor Name

Section 1.4 Contractor Address

Section 1.11 Contractor Signature (witnessed by a Notary Public or Justice of the Peace)

Section 1.12 Name & Title of Contractor Signatory (if Vendor is not a sole proprietor)

Section 1.13 Acknowledgement (completed or verified by the Notary Public or Justice of the Peace)

- Provide certificate of insurance indicating the coverage amounts required by Section 14 of the Form Number P-37.
- Provide proof of sufficient workers' compensation insurance coverage or evidence of exemption from RSA Chapter 81-A.
- If the successful Vendor is a corporation, limited liability company, or other limited liability business entity, then provide a certificate of good standing issued by the NH Secretary of State or, for a newly incorporated, formed, or registered entity, a copy of the appropriate registration document certified by the NH Secretary of State.

28. SPECIFICATIONS:

Complete specifications required are detailed in the Exhibit B-SCOPE OF SERVICES, Exhibit D- PROJECT SPECIFICATIONS, and Exhibit E- PROJECT DRAWINGS sections of this bid invitation. In responding to the bid invitation, the prospective Vendor shall address all requirements for information as outlined herein.

29. SITE VISITATION:

Bidders will ONLY be allowed to visit the site at the published date and time in the RFB. These are active military installations and unscheduled site visits are not authorized. Whether or not a contractor attends a site visit, their bid is a statement that they have ascertained pertinent local conditions; such as location, accessibility and general character of the site or building, the character and extent of existing work within or adjacent to the site, and any other work being performed thereon at the time of the submission of his bid.

A non-mandatory bidder's conference (walk-through) will be held at 8:00 a.m. on 4/27/2021.

30. WARRANTY REQUIREMENTS:

The successful Vendor shall be required to provide warranties on all equipment provided by the Vendor for a period of not less than one (1) year or the manufacturer's standard warranty period, whichever is greater, commencing on the date that the equipment is received, inspected, and accepted by the State of New Hampshire. The warranty shall cover 100% of repair or replacement costs, including all parts, shipping, labor, travel, lodging, and expenses.

31. OBLIGATIONS AND LIABILITY OF THE VENDOR:

The successful Vendor shall perform all work and furnish all materials, tools, equipment and safety devices necessary to perform the requested services in the manner and within the time hereinafter specified. The Vendor shall provide said services to the satisfaction of the State and in accordance with the specifications and at the price set forth herein. All work to be performed and all equipment to be furnished pursuant to the Scope of Services included herein shall be performed and furnished in strict accordance with the specifications included herein, the terms of any contract awarded as a result of this solicitation, any associated contract drawings, and the directions of State representatives as may be given from time to time while the work is in progress.

The successful Vendor shall take full responsibility for the work to be performed pursuant to the Scope of Services included herein; for the protection of said work; and for preventing injuries to persons and damage to property and utilities on or about said work. The Vendor shall in no way be relieved of such responsibility by any authority of the State to give permission or issue orders relating to any part of the work, by any such permission given or orders issued, or by any failure of the State to give such permission or issue such orders. The successful Vendor shall bear all losses accruing to the Vendor as a result of the amount, quality, or character of the work required, or because the nature or characteristics of the work location is different from what the Vendor estimated or expected, or due to delays or other complications caused by the weather, elements, or other natural causes.

The successful Vendor agrees that any damage or injury to any buildings, materials, equipment, or other property resulting from the Vendor's performance of the requested services shall be repaired at the Vendor's own expense so that such buildings, materials, equipment, or other property are satisfactorily restored to their prior condition.

32. OFFER:

Vendor hereby offers to perform the services to the State of New Hampshire as specified at the prices outlined on the following BID FORM, in complete accordance with the general and detailed specifications included herewith. In the event of a discrepancy between the numerical bid and the verbal bid, the verbal bid shall control.

**STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES**

BID FORM

BID OPENING

Date: May 10, 2021

Time: 10:15 a.m.

Subject: SMR, BLDG C Latrines Project

Contract Price

Numerical Bid \$ _____

Verbal Bid _____

Deduct alternate #1

Existing vinyl tile, baseboard, & base cabinets to remain in breakroom 133 & corridor 134; contractor to furnish & install new metal flooring transition strip between corridor 130 & corridor 134.

Numerical Bid \$ _____

Verbal Bid _____

Deduct alternate #2

Provide new counter w/backsplash, apron, complete lavatory assembly (See plumbing DWG's.) As detailed (see detail 7/A2.1) in lieu of new one-piece solid surface manufactured lavatory system as specified.

Numerical Bid \$ _____

Verbal Bid _____

Deduct Alternate #3

Provide new 4x4 ceramic wall wainscot 2/half-tile wall cap tile & epoxy grout, where indicated on interior elevations, see wainscot wall tile detail 10/A1.2, in lieu of new 4x4 ceramic wall tile w/accent tiles & epoxy grout see ceiling heightwall tile detail 10/A1.2;

Numerical Bid \$ _____

Verbal Bid _____

33. VENDOR CONTACT INFORMATION:

Please provide contact information below for a person knowledgeable of and who can answer questions regarding, this bid response.

Contact Person	Local Telephone Number	Toll Free Telephone Number
E-mail Address	Company Website	
Vendor Company Name	Vendor Address	

34. PROJECT LOCATION(S):

State Military Reservation, 4 Pembroke Road, BLDG C. Concord, NH 03301

35. ATTACHMENTS:

The following attachments are an integral part of this bid invitation:

- Attachment 1: Sample P-37 Form
- Exhibit A- Special Provisions
- Exhibit B- Scope of Services
- Exhibit B Attachment 1- Project Specifications
- Exhibit B Attachment 2- Project Drawings
- Exhibit C- Method of Payment

Note: To be considered, bid shall be signed and notarized on front cover sheet in the space provided.

ATTACHMENT 1

SAMPLE FORM TO BE COMPLETED UPON AWARD

FORM NUMBER P-37 (version 12/11/2019)

Notice: This agreement and all of its attachments shall become public upon submission to Governor and Executive Council for approval. Any information that is private, confidential or proprietary must be clearly identified to the agency and agreed to in writing prior to signing the contract.

AGREEMENT

The State of New Hampshire and the Contractor hereby mutually agree as follows:

GENERAL PROVISIONS

1. IDENTIFICATION.

1.1 State Agency Name		1.2 State Agency Address	
1.3 Contractor Name		1.4 Contractor Address	
1.5 Contractor Phone Number	1.6 Account Number	1.7 Completion Date	1.8 Price Limitation
1.9 Contracting Officer for State Agency		1.10 State Agency Telephone Number	
1.11 Contractor Signature <div style="text-align: right;">Date:</div>		1.12 Name and Title of Contractor Signatory	
1.13 State Agency Signature <div style="text-align: right;">Date:</div>		1.14 Name and Title of State Agency Signatory	
1.15 Approval by the N.H. Department of Administration, Division of Personnel <i>(if applicable)</i> By: _____ Director, On: _____			
1.16 Approval by the Attorney General (Form, Substance and Execution) <i>(if applicable)</i> By: _____ On: _____			
1.17 Approval by the Governor and Executive Council <i>(if applicable)</i> G&C Item number: _____ G&C Meeting Date: _____			

2. SERVICES TO BE PERFORMED. The State of New Hampshire, acting through the agency identified in block 1.1 ("State"), engages contractor identified in block 1.3 ("Contractor") to perform, and the Contractor shall perform, the work or sale of goods, or both, identified and more particularly described in the attached EXHIBIT B which is incorporated herein by reference ("Services").

3. EFFECTIVE DATE/COMPLETION OF SERVICES.

3.1 Notwithstanding any provision of this Agreement to the contrary, and subject to the approval of the Governor and Executive Council of the State of New Hampshire, if applicable, this Agreement, and all obligations of the parties hereunder, shall become effective on the date the Governor and Executive Council approve this Agreement as indicated in block 1.17, unless no such approval is required, in which case the Agreement shall become effective on the date the Agreement is signed by the State Agency as shown in block 1.13 ("Effective Date").

3.2 If the Contractor commences the Services prior to the Effective Date, all Services performed by the Contractor prior to the Effective Date shall be performed at the sole risk of the Contractor, and in the event that this Agreement does not become effective, the State shall have no liability to the Contractor, including without limitation, any obligation to pay the Contractor for any costs incurred or Services performed. Contractor must complete all Services by the Completion Date specified in block 1.7.

4. CONDITIONAL NATURE OF AGREEMENT.

Notwithstanding any provision of this Agreement to the contrary, all obligations of the State hereunder, including, without limitation, the continuance of payments hereunder, are contingent upon the availability and continued appropriation of funds affected by any state or federal legislative or executive action that reduces, eliminates or otherwise modifies the appropriation or availability of funding for this Agreement and the Scope for Services provided in EXHIBIT B, in whole or in part. In no event shall the State be liable for any payments hereunder in excess of such available appropriated funds. In the event of a reduction or termination of appropriated funds, the State shall have the right to withhold payment until such funds become available, if ever, and shall have the right to reduce or terminate the Services under this Agreement immediately upon giving the Contractor notice of such reduction or termination. The State shall not be required to transfer funds from any other account or source to the Account identified in block 1.6 in the event funds in that Account are reduced or unavailable.

5. CONTRACT PRICE/PRICE LIMITATION/PAYMENT.

5.1 The contract price, method of payment, and terms of payment are identified and more particularly described in EXHIBIT C which is incorporated herein by reference.

5.2 The payment by the State of the contract price shall be the only and the complete reimbursement to the Contractor for all expenses, of whatever nature incurred by the Contractor in the performance hereof, and shall be the only and the complete

compensation to the Contractor for the Services. The State shall have no liability to the Contractor other than the contract price.

5.3 The State reserves the right to offset from any amounts otherwise payable to the Contractor under this Agreement those liquidated amounts required or permitted by N.H. RSA 80:7 through RSA 80:7-c or any other provision of law.

5.4 Notwithstanding any provision in this Agreement to the contrary, and notwithstanding unexpected circumstances, in no event shall the total of all payments authorized, or actually made hereunder, exceed the Price Limitation set forth in block 1.8.

6. COMPLIANCE BY CONTRACTOR WITH LAWS AND REGULATIONS/ EQUAL EMPLOYMENT OPPORTUNITY.

6.1 In connection with the performance of the Services, the Contractor shall comply with all applicable statutes, laws, regulations, and orders of federal, state, county or municipal authorities which impose any obligation or duty upon the Contractor, including, but not limited to, civil rights and equal employment opportunity laws. In addition, if this Agreement is funded in any part by monies of the United States, the Contractor shall comply with all federal executive orders, rules, regulations and statutes, and with any rules, regulations and guidelines as the State or the United States issue to implement these regulations. The Contractor shall also comply with all applicable intellectual property laws.

6.2 During the term of this Agreement, the Contractor shall not discriminate against employees or applicants for employment because of race, color, religion, creed, age, sex, handicap, sexual orientation, or national origin and will take affirmative action to prevent such discrimination.

6.3 The Contractor agrees to permit the State or United States access to any of the Contractor's books, records and accounts for the purpose of ascertaining compliance with all rules, regulations and orders, and the covenants, terms and conditions of this Agreement.

7. PERSONNEL.

7.1 The Contractor shall at its own expense provide all personnel necessary to perform the Services. The Contractor warrants that all personnel engaged in the Services shall be qualified to perform the Services, and shall be properly licensed and otherwise authorized to do so under all applicable laws.

7.2 Unless otherwise authorized in writing, during the term of this Agreement, and for a period of six (6) months after the Completion Date in block 1.7, the Contractor shall not hire, and shall not permit any subcontractor or other person, firm or corporation with whom it is engaged in a combined effort to perform the Services to hire, any person who is a State employee or official, who is materially involved in the procurement, administration or performance of this Agreement. This provision shall survive termination of this Agreement.

7.3 The Contracting Officer specified in block 1.9, or his or her successor, shall be the State's representative. In the event of any dispute concerning the interpretation of this Agreement, the Contracting Officer's decision shall be final for the State.

8. EVENT OF DEFAULT/REMEDIES.

8.1 Any one or more of the following acts or omissions of the Contractor shall constitute an event of default hereunder ("Event of Default"):

8.1.1 failure to perform the Services satisfactorily or on schedule;

8.1.2 failure to submit any report required hereunder; and/or

8.1.3 failure to perform any other covenant, term or condition of this Agreement.

8.2 Upon the occurrence of any Event of Default, the State may take any one, or more, or all, of the following actions:

8.2.1 give the Contractor a written notice specifying the Event of Default and requiring it to be remedied within, in the absence of a greater or lesser specification of time, thirty (30) days from the date of the notice; and if the Event of Default is not timely cured, terminate this Agreement, effective two (2) days after giving the Contractor notice of termination;

8.2.2 give the Contractor a written notice specifying the Event of Default and suspending all payments to be made under this Agreement and ordering that the portion of the contract price which would otherwise accrue to the Contractor during the period from the date of such notice until such time as the State determines that the Contractor has cured the Event of Default shall never be paid to the Contractor;

8.2.3 give the Contractor a written notice specifying the Event of Default and set off against any other obligations the State may owe to the Contractor any damages the State suffers by reason of any Event of Default; and/or

8.2.4 give the Contractor a written notice specifying the Event of Default, treat the Agreement as breached, terminate the Agreement and pursue any of its remedies at law or in equity, or both.

8.3. No failure by the State to enforce any provisions hereof after any Event of Default shall be deemed a waiver of its rights with regard to that Event of Default, or any subsequent Event of Default. No express failure to enforce any Event of Default shall be deemed a waiver of the right of the State to enforce each and all of the provisions hereof upon any further or other Event of Default on the part of the Contractor.

9. TERMINATION.

9.1 Notwithstanding paragraph 8, the State may, at its sole discretion, terminate the Agreement for any reason, in whole or in part, by thirty (30) days written notice to the Contractor that the State is exercising its option to terminate the Agreement.

9.2 In the event of an early termination of this Agreement for any reason other than the completion of the Services, the Contractor shall, at the State's discretion, deliver to the Contracting Officer, not later than fifteen (15) days after the date of termination, a report ("Termination Report") describing in detail all Services performed, and the contract price earned, to and including the date of termination. The form, subject matter, content, and number of copies of the Termination Report shall be identical to those of any Final Report described in the attached EXHIBIT B. In addition, at the State's discretion, the Contractor shall, within 15 days of notice of early termination, develop and

submit to the State a Transition Plan for services under the Agreement.

10. DATA/ACCESS/CONFIDENTIALITY/PRESERVATION.

10.1 As used in this Agreement, the word "data" shall mean all information and things developed or obtained during the performance of, or acquired or developed by reason of, this Agreement, including, but not limited to, all studies, reports, files, formulae, surveys, maps, charts, sound recordings, video recordings, pictorial reproductions, drawings, analyses, graphic representations, computer programs, computer printouts, notes, letters, memoranda, papers, and documents, all whether finished or unfinished.

10.2 All data and any property which has been received from the State or purchased with funds provided for that purpose under this Agreement, shall be the property of the State, and shall be returned to the State upon demand or upon termination of this Agreement for any reason.

10.3 Confidentiality of data shall be governed by N.H. RSA chapter 91-A or other existing law. Disclosure of data requires prior written approval of the State.

11. CONTRACTOR'S RELATION TO THE STATE. In the performance of this Agreement the Contractor is in all respects an independent contractor, and is neither an agent nor an employee of the State. Neither the Contractor nor any of its officers, employees, agents or members shall have authority to bind the State or receive any benefits, workers' compensation or other emoluments provided by the State to its employees.

12. ASSIGNMENT/DELEGATION/SUBCONTRACTS.

12.1 The Contractor shall not assign, or otherwise transfer any interest in this Agreement without the prior written notice, which shall be provided to the State at least fifteen (15) days prior to the assignment, and a written consent of the State. For purposes of this paragraph, a Change of Control shall constitute assignment. "Change of Control" means (a) merger, consolidation, or a transaction or series of related transactions in which a third party, together with its affiliates, becomes the direct or indirect owner of fifty percent (50%) or more of the voting shares or similar equity interests, or combined voting power of the Contractor, or (b) the sale of all or substantially all of the assets of the Contractor.

12.2 None of the Services shall be subcontracted by the Contractor without prior written notice and consent of the State. The State is entitled to copies of all subcontracts and assignment agreements and shall not be bound by any provisions contained in a subcontract or an assignment agreement to which it is not a party.

13. INDEMNIFICATION. Unless otherwise exempted by law, the Contractor shall indemnify and hold harmless the State, its officers and employees, from and against any and all claims, liabilities and costs for any personal injury or property damages, patent or copyright infringement, or other claims asserted against the State, its officers or employees, which arise out of (or which

may be claimed to arise out of) the acts or omission of the Contractor, or subcontractors, including but not limited to the negligence, reckless or intentional conduct. The State shall not be liable for any costs incurred by the Contractor arising under this paragraph 13. Notwithstanding the foregoing, nothing herein contained shall be deemed to constitute a waiver of the sovereign immunity of the State, which immunity is hereby reserved to the State. This covenant in paragraph 13 shall survive the termination of this Agreement.

14. INSURANCE.

14.1 The Contractor shall, at its sole expense, obtain and continuously maintain in force, and shall require any subcontractor or assignee to obtain and maintain in force, the following insurance:

14.1.1 commercial general liability insurance against all claims of bodily injury, death or property damage, in amounts of not less than \$1,000,000 per occurrence and \$2,000,000 aggregate or excess; and

14.1.2 special cause of loss coverage form covering all property subject to subparagraph 10.2 herein, in an amount not less than 80% of the whole replacement value of the property.

14.2 The policies described in subparagraph 14.1 herein shall be on policy forms and endorsements approved for use in the State of New Hampshire by the N.H. Department of Insurance, and issued by insurers licensed in the State of New Hampshire.

14.3 The Contractor shall furnish to the Contracting Officer identified in block 1.9, or his or her successor, a certificate(s) of insurance for all insurance required under this Agreement. Contractor shall also furnish to the Contracting Officer identified in block 1.9, or his or her successor, certificate(s) of insurance for all renewal(s) of insurance required under this Agreement no later than ten (10) days prior to the expiration date of each insurance policy. The certificate(s) of insurance and any renewals thereof shall be attached and are incorporated herein by reference.

15. WORKERS' COMPENSATION.

15.1 By signing this agreement, the Contractor agrees, certifies and warrants that the Contractor is in compliance with or exempt from, the requirements of N.H. RSA chapter 281-A ("*Workers' Compensation*").

15.2 To the extent the Contractor is subject to the requirements of N.H. RSA chapter 281-A, Contractor shall maintain, and require any subcontractor or assignee to secure and maintain, payment of Workers' Compensation in connection with activities which the person proposes to undertake pursuant to this Agreement. The Contractor shall furnish the Contracting Officer identified in block 1.9, or his or her successor, proof of Workers' Compensation in the manner described in N.H. RSA chapter 281-A and any applicable renewal(s) thereof, which shall be attached and are incorporated herein by reference. The State shall not be responsible for payment of any Workers' Compensation premiums or for any other claim or benefit for Contractor, or any subcontractor or employee of Contractor, which might arise under applicable State of New Hampshire

Workers' Compensation laws in connection with the performance of the Services under this Agreement.

16. NOTICE. Any notice by a party hereto to the other party shall be deemed to have been duly delivered or given at the time of mailing by certified mail, postage prepaid, in a United States Post Office addressed to the parties at the addresses given in blocks 1.2 and 1.4, herein.

17. AMENDMENT. This Agreement may be amended, waived or discharged only by an instrument in writing signed by the parties hereto and only after approval of such amendment, waiver or discharge by the Governor and Executive Council of the State of New Hampshire unless no such approval is required under the circumstances pursuant to State law, rule or policy.

18. CHOICE OF LAW AND FORUM. This Agreement shall be governed, interpreted and construed in accordance with the laws of the State of New Hampshire, and is binding upon and inures to the benefit of the parties and their respective successors and assigns. The wording used in this Agreement is the wording chosen by the parties to express their mutual intent, and no rule of construction shall be applied against or in favor of any party. Any actions arising out of this Agreement shall be brought and maintained in New Hampshire Superior Court which shall have exclusive jurisdiction thereof.

19. CONFLICTING TERMS. In the event of a conflict between the terms of this P-37 form (as modified in EXHIBIT A) and/or attachments and amendment thereof, the terms of the P-37 (as modified in EXHIBIT A) shall control.

20. THIRD PARTIES. The parties hereto do not intend to benefit any third parties and this Agreement shall not be construed to confer any such benefit.

21. HEADINGS. The headings throughout the Agreement are for reference purposes only, and the words contained therein shall in no way be held to explain, modify, amplify or aid in the interpretation, construction or meaning of the provisions of this Agreement.

22. SPECIAL PROVISIONS. Additional or modifying provisions set forth in the attached EXHIBIT A are incorporated herein by reference.

23. SEVERABILITY. In the event any of the provisions of this Agreement are held by a court of competent jurisdiction to be contrary to any state or federal law, the remaining provisions of this Agreement will remain in full force and effect.

24. ENTIRE AGREEMENT. This Agreement, which may be executed in a number of counterparts, each of which shall be deemed an original, constitutes the entire agreement and understanding between the parties, and supersedes all prior agreements and understandings with respect to the subject matter hereof.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES
RFB DMAVS 2021-03
SMR, BLDG C Latrines Project
ADDENDUM #1

Posted: 4/26/21

DATE OF BID CLOSING: 05/10/2021

TIME OF BID CLOSING: 10:00AM

Currently Bids Reads:

1. Attachment#5, is too small to read project plans.

Bids must be clearly marked as follows:

1. Updated Attachment#5, document is easier to read. Please review updated attachment#5.
2. Please note: Attachment#5a is BLDG C. LATRINES PROJECT DRAWINGS coverpage.

NOTE: ALL CHANGES TO BID SOLICATION NOTED IN ADDEDUMS WILL SUPERSEDE PREVIOUSLY SUBMITTED DOCUMENTS. ALL OTHER SPECIFICATIONS REMAIN UNCHANGED AND VALID.

POC for this Addendum is Ryan Godin Procurement Technician, 603-227-5094,
ryan.m.godin@dmavs.nh.gov.

STATE OF NEW HAMPSHIRE
DEPARTMENT OF MILITARY AFFAIRS AND VETERANS SERVICES
RFB DMAVS 2021-03
SMR, BLDG C Latrines Project
ADDENDUM #2
Posted: 5/5/2021

DATE OF BID CLOSING: 05/10/2021

TIME OF BID CLOSING: 10:00AM

Questions asked during inquiry period:

- 1.) Plan D1.0 / Demolition Note Legend D2 states to remove vinyl tile flooring, base, adhesive, etc., in their entirety in breakroom 129 & corridor 134 to the extent indicated. Breakroom 129 does not appear on the plans. Should this breakroom be breakroom 133?
 - a. Change Breakroom 129 to read Breakroom 133.

- 2.) Plan A1.1 / Construction Note Legend #2 states new 4" thick reinforced concrete floor slab, with 6" x 6" 1.4/1.4 W.W.M, ect. Also, Miscellaneous cast-in-place concrete specification 2.7 Concrete Mixtures note C. Synthetic Fiber states the use Synthetic Fiber. Please confirm the intent is to use both W.W.M. and Synthetic Fiber.
 - a. Contractor's option to use W.W.M. OR Synthetic Fiber Reinforcement.

- 3.) Exhibit B, Attachment 1 / Section 01 50 00 Temporary Facilities and Controls / 9. Field Office and Sheds states to provide a portable or mobile building. Please confirm the general contractor is required to provide a mobile building/trailer for this project.
 - a. The contractor is not required to provide a field office however, per the same section noted above, use of the existing facility for a field office is not permitted in this case as there is no available space outside the construction area.

NOTE: ALL CHANGES TO BID SOLICITATION NOTED IN ADDEDUMS WILL SUPERSEDE PREVIOUSLY SUBMITTED DOCUMENTS. ALL OTHER SPECIFICATIONS REMAIN UNCHANGED AND VALID.

POC for this Addendum is Ryan Godin Procurement Technician, 603-227-5094,
ryan.m.godin@dmavs.nh.gov.