



INVITATION TO BID

SUBMIT BID TO: Grambling State University
Purchasing Department
purchasingbids@gram.edu

To maintain the integrity of the bid process, please **do not cc** any other University email address when submitting your bid.

Bid Number: 50018-260013

DATE: SEPTEMBER 11, 2025

Purchasing Department Contacts: Erin Walker (318-274-3280)
walkere@gram.edu

TITLE: INTERIOR RENOVATION OF BASEMENT LEVEL-TL JAMES HALL

Drawings upon request contact info.
318-327-7654 or
kmiller@archplus.com

BID SCHEDULE: SEPTEMBER 24, 2025

DUE DATE/TIME (*email only*): SEPTEMBER 24, 2025 BY 2:00 PM

CST BID OPENING (*Zoom*): SEPTEMBER 24, 2025 AT 2:05 PM CST

MEETING ID: 880 2116 1133

PASSWORD: 063984

<https://us06web.zoom.us/j/88021161133?pwd=Ba9K16EJOubdL76bdebhW5D2Qflgis.1>

General Instructions to Bidders

1. Grambling State University reserves the right to award items separately, grouped or on an all or none basis and to reject any or all bids and waive any informalities.
2. Hard copies of sealed bids will no longer be accepted. All bids must be received electronically by the due date and time to be considered.
3. Sealed bids for furnishing the items and/or services specified are hereby solicited, and will be received by the issuing Grambling State University Campus/Department at the "Submit Bid To" address stated above, until the specified due date and time. Bidder is solely responsible for the timely delivery of bid. The Purchasing Office is not responsible for any delays. It is the responsibility of the Supplier to ensure the bid is received by GSU Purchasing by the indicated due date and time. Any delays that may occur in transmission of the bid is the responsibility of the supplier. A bid will be considered late if it is not received at the "Submit Bid TO" email address by the indicated due date and time.
4. The maximum email attachment size accepted is 125 MB. It is the supplier's responsibility to ensure bid submission is sized such that it is successfully transmitted and received by GSU. If the bid response is too large to be emailed as one document, the bid must be sent as separate documents. Each submittal should be labeled. (Example – Bid Submittal 1 out of 3 for IFB-50018-26XXXX - Title; Bid Submittal 2 out of 3 for IFB-50018-26XXXX - Title, etc.). If any submittal is received late, GSU will not consider the late submittal(s). Only the submittal(s) received by the due date and time will be considered. Late bids will not be accepted per
5. Bid submissions must be signed by a person authorized to bind the vendor. In accordance with Louisiana R.S. 39:1594, the person signing the bid must be:
 - (1) any corporate officer listed on the most current annual report on file with the secretary of state, or the signature on the bid is that of any member of a partnership or partnership in commended listed in the most current partnership records on file with the secretary of state; or
 - (2) an authorized representative of the corporation, partnership, or other legal entity and the Bidder submits or provides upon request a corporate resolution, certification as to the corporate principal, or other documents indicating authority which are acceptable to the public entity, including registration on an electronic Internet database maintained by the public entity; or
 - (3) entity has filed in the appropriate records of the secretary of state in which the public entity is located, an affidavit, resolution, or other acknowledged or authentic document indicating the names of all parties authorized to submit bids for public contracts.
6. When bid is submitted by email, **the subject line must show the Solicitation/File No.** and submission must be received by bid deadline.

7. Read the entire solicitation, including all terms, conditions and specifications within this packet.
8. All bid information and prices must be typed or written in ink. Any corrections, erasures or other forms of alteration to unit prices are to be initialed by the Bidder.
9. Bid prices shall include all delivery charges paid by the vendor, F.O.B. Grambling State University Destination, unless otherwise provided in the solicitation. Any invoiced delivery charges not quoted and itemized on the Grambling State University purchase order are subject to rejection and non-payment.
10. Payment terms: Net 30 after receipt of properly executed invoice or delivery and acceptance, whichever is later.
11. By signing this solicitation, the Bidder certifies compliance with all general instructions to Bidders, terms, conditions and specifications; and further certifies that this bid is made without collusion or fraud. MANDATORY bid requirements are detailed immediately following the Standard Terms & Conditions section.
12. Quantities listed in these specifications are approximate and are not guaranteed by the University. The University reserves the right to **increase or reduce** quantity as needed if in the best interest of the University.
13. **Bid Bonds: Are required on ALL bids and/or Public Works Project over \$25,000**, a bid bond must be submitted for each separate bid response. The bid bond shall be in an amount equal to 5% of the bid price submitted and alternates, if any. The bid security shall be in a form of a bid bond or certified check, or cashier's check.

*****FOR THIS BID SOLICITATION: To provide the most comprehensive coverage for this renovation project, bidders are required to submit a bid bond during the bidding phase and transition to a performance bond once the contractor is selected. This approach ensures both the integrity of the bidding process and the successful completion of the project.**
14. The Contractor is required to record the Contract with the Clerk of Court in Lincoln Parish and must provide the Purchasing Department with proof of filing. Additionally, **a Performance Bond will be required at the time of the award of the contract.**

(PLEASE NOTE THAT A BID BOND MUST BE SIGNED BY THE AGENT OR ATTORNEY-IN-FACT OF THE SURETY.)

(*) The surety or insurance company furnishing the bid bond shall be currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies or by an insurance company that is either domiciled in Louisiana or owned by Louisiana residents and is licensed to write surety bonds.

Architecture+
300 Washington Street - Suite 400
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Joseph L. Cassiere, Architect of Record

ADVERTISEMENT

September 11, 2025

PUBLIC NOTICE INVITATION TO BID

Sealed bids will be received by the Purchasing Department, GRAMBLING STATE UNIVERSITY, Grambling, La. On September 24, 2025 at 2:05, P.M. for: "50018-260013" Interior Renovation of Basement Level – T.L. James Hall. At which time and place the bids will be publicly opened and read aloud. Any bid received after closing time will be returned unopened.

Per-Bid Meeting is scheduled on September 16, 2025 at 11:00am, at the Purchasing Conference Rm, 429 Main Street, Grambling, LA 71245.

Copies of the specifications may be obtained in electronic format by visiting the State of Louisiana, Office of State Purchasing, LaPAC Web Site, <https://www.cfprd.doa.louisiana.gov/osp/lapac/dspBid.cfm?search=department&term=53> Copies of specifications are on file in the Office of the Director of Purchasing, GRAMBLING STATE UNIVERSITY, Grambling, La. To obtain a copy of the specifications from Grambling State University, call (318)-274-3280 or e-mail walkere@gram.edu.

Bids must be returned to the Purchasing Office at purchasingbids@gram.edu by the due date and time referenced. Bids must be submitted on the forms enclosed with the bid specification, and in strict conformity with the intent of same without modifications. Bids must be signed in ink, dated, and title of person signing the bid should be shown on the bid.

Evidence of General Liability Insurance, Auto Liability Insurance, and Workers Compensation Insurance required for this contract.

No bid may be withdrawn after the scheduled closing time for receipt of bids for at least thirty (30) days.

The University reserves the right to reject any or all bids, and to waive any informalities.

Evidence of authority to submit the bid shall be required in accordance with R.S. 38:2212(B)(5) and/or R.S. 39:1594(C)(4).

An Equal Opportunity Employer.

GRAMBLING STATE UNIVERSITY
GRAMBLING, LOUISIANA

Erin Walker
Director of Purchasing

TO APPEAR: 9/11/2025
BID DUE: 9/25/2025

STANDARD TERMS & CONDITIONS INVITATION TO BID

These standard terms and conditions shall apply to all Grambling State University solicitations, unless otherwise specifically amended and provided for in the special terms and conditions, specifications, or other solicitation documents. In the event of conflict between the General Instructions to Bidders or Standard Terms & Conditions and the Special Terms & Conditions, the Special Terms & Conditions shall govern.

Bids submitted are subject to provisions of the laws of the State of Louisiana, including but not limited to: the Louisiana Procurement Code (R.S. 39:1551-1736); Purchasing Rules and Regulations (Title 34 of the Louisiana Administrative Code); Executive Orders; and the terms, conditions, and specifications stated in this solicitation.

1. **Bid Delivery and Receipt:** To be considered, Bidders may submit bids electronically to purchasingbids@gram.edu When bid is submitted by email, the subject line must show the Solicitation/File No. and must be received by bid deadline.

Bidders are advised that the U.S. Postal Service does not make deliveries to the Purchasing Office. Bids will no longer be accepted by mail or in person. Bidder is solely responsible for the timely delivery of its bid, and failure to meet the bid due date and time shall result in rejection of the bid.

2. **Bid Forms:** Bids are to be submitted on and in accordance with the Grambling State University solicitation forms provided, and must be signed by an authorized agent of the vendor. Bids submitted on other forms or in other price formats may be considered informal and may be rejected in part or in its entirety. Bids submitted in pencil and/or bids containing no original signature indicating the Bidder's intent to be bound will not be accepted.
3. **Interpretation of Solicitation/Bidder Inquiries:** If Bidder is in doubt as to the meaning of any part or requirement of this solicitation, Bidder may submit a written request for interpretation to the Grambling State University Purchasing at the email address on page 1 of this solicitation. Written inquiries must be received in the Grambling State University Purchasing Department no later than five (5) calendar days prior to the opening of bids, and shall be clearly cross-referenced to the relevant solicitation/specification in question.

No decisions or actions shall be executed by any Bidder as a result of oral discussions with any Grambling State University employee or consultant. Any interpretation of the documents will be made by formal addendum only, issued by the Grambling State University Purchasing Department. It is the responsibility of the bidder, prior to submitting their bid, to periodically visit the State of Louisiana Purchasing Department LaPAC website, or contact the Grambling State University Purchasing Department, to identify if any addendums were issued. Grambling State University shall not be responsible for any other interpretations or assumptions made by Bidder.

4. **Bid Opening:** In-person bid openings have been suspended for the foreseeable future. Bidders may attend the public bid opening of sealed bids and proposals conducted on Zoom. No information or opinions concerning the ultimate contract award will be given at bid opening or during the evaluation process. Written bid tabulations will not be furnished. Bids may be examined within 72 hours after bid opening. Information pertaining to completed files may be secured by submitting a written request to the Grambling State University Purchasing at the email address shown in header.
5. **Special Accommodations:** Any "qualified individual with a disability" as defined by the Americans with Disabilities Act, who has submitted a bid and desires to attend the public bid opening, must notify the Grambling State University Purchasing Department in writing not later than seven days prior to the bid opening date of their need for special accommodations. If the request cannot be reasonably provided, the individual will be informed prior to the bid opening.
6. **Standards of Quality:** Any product or service bid shall conform to all applicable federal, state and local laws and regulations, and the specifications contained in the solicitation. Any manufacturer's name, trade name, brand name, or catalog number used in the specification is for the purpose of describing the standard of quality, performance, and characteristics desired; and is not intended to limit or restrict competition. Bidder must specify the brand and model number of the product offered in his bid. Bids not specifying brand and model number shall be considered as offering the exact product specified in the solicitation.
7. **New Products/Warranty/Patents:** All products bid for purchase must be new, never previously used, of the manufacturer's current model and/or packaging, and of best quality as measured by acceptable trade standards. No remanufactured, demonstrator, used or irregular products will be considered for purchase unless otherwise specified.

The manufacturer's standard published warranty and provisions shall apply, unless more stringent warranties are otherwise required by Grambling State University and specified in the solicitation. In such cases, the Bidder and/or manufacturer shall honor the specified warranty requirements, and bid prices shall include any premium costs of such coverage.

Bidder guarantees that the products proposed and furnished will not infringe upon any valid patent or trademark; and shall, at its own expense, defend any and all actions or suits charging such infringement, and shall save Grambling State University harmless. Descriptive Information: Bidders proposing an equivalent brand or model should submit descriptive information (such as

literature, technical data, illustrations, etc.) sufficient for Grambling State University to evaluate quality, suitability, and compliance with the specifications with the bid submission. Failure to submit descriptive information may cause bid to be rejected. Any changes made by Bidder to a manufacturer's published specifications shall be verifiable by the manufacturer. If items bid do not fully comply with specifications, Bidder should state in what respect items deviate. Bidder's failure to note exceptions in its bid will not relieve the Bidder from supplying the actual products requested.

8. Bids/Prices/F.O.B. Point

- The bid price for each item is to be quoted on a "net" basis and F.O.B. Grambling State University Destination, i.e. title passing upon receipt and inclusive of all delivery charges, any item discounts, etc.
- Bids other than F.O.B. Grambling State University Destination may be rejected.
- Bids indicating estimated freight charges may be rejected.
- Bids requiring deposits, payment in advance, or C.O.D. terms may be rejected.
- Bidders who do not quote "net" item prices and who separately quote an overall "lump sum" freight cost or discount for all items shall be considered as submitting an "all-or-none" bid for evaluation and award purposes; and risk rejection if award is made on an item basis.
- Prices shall be firm for acceptance for a minimum of 30 days, unless otherwise specified. Bids conditioned with shorter acceptance periods may be rejected.
- Prices are to be quoted in the unit/package specified (e.g. each, 12/box, etc), or may be rejected.
- In the event of extension errors, the unit price bid shall prevail.

9. Taxes: Vendor is responsible for including all applicable taxes in the bid price. Grambling State University is exempt from all Louisiana state and local sales and use taxes. By accepting an award, resident and non-resident firms acknowledge their responsibility for the payment of all taxes duly assessed by the State of Louisiana and its political subdivisions for which they are liable, including but not limited to: franchise taxes, privilege taxes, sales taxes, use taxes, ad valorem taxes, etc.

10. Terms and Conditions: This solicitation contains all terms and conditions with respect to the purchase of the goods and/or services specified herein. Submittal of any contrary terms and conditions may cause your bid to be rejected. By signing and submitting a bid, vendor agrees that contrary terms and conditions which may be included in its bid are nullified; and agrees that this contract shall be construed in accordance with this solicitation and governed by the laws of the State of Louisiana.

11. Vendor Forms/ Grambling State University Signature Authority: The terms and conditions of the Grambling State University solicitation, purchase order and contract shall solely govern the purchase agreement, and shall not be amended by any vendor contract, form, etc.

The University's has assigned delegated authorities to execute/sign any vendor contracts, forms, etc., on behalf of Grambling State University as a result of any award of the solicitation. Departments are expressly prohibited from signing any vendor forms.

Any such vendor contracts/forms bearing unauthorized signatures shall be null and void, shall have no legal force, and shall not be recognized by Grambling State University in any dispute arising therefrom. Vendors who present any such forms to department users for signature without regard to this strict Grambling State University policy may face contract cancellation, suspension, and/or debarment.

12. Awards: The intent to award this bid on an all-or-none basis to the lowest responsible and responsive Bidder will be stated on the bid form. For bids with several items, Grambling State University reserves the right: (1) to award items separately, grouped, or on an all-or-none basis, as deemed in its best interest; (2) to reject any or all bids and/or items; and (3) to waive any informalities.

All solicitation specifications, terms and conditions shall be made part of any subsequent award as if fully reproduced and included therein, unless specifically amended in the formal contract.

13. Acceptance of Bid: Only the issuance of an official Grambling State University purchase order, contract, Notification of Award letter, or a Notification of Intent to Award letter shall constitute the University's acceptance of a bid. Grambling State University shall not be responsible in any way to a vendor for goods delivered or services rendered without an official purchase order and/or contract.

14. Applicable Law: All contracts shall be construed in accordance with and governed by the laws of the State of Louisiana.

15. Awarded Products/Unauthorized Substitutions: Only those awarded brands and numbers stated in the Grambling State University contract are approved for delivery, acceptance, and payment purposes. Any substitutions must be reviewed and approved by the Grambling State University Purchasing Department prior to awarding the contract. Unauthorized product substitutions are subject to rejection at time of delivery, post-return at vendor's expense, and non-payment. Testing/Rejected Goods: Vendor warrants that the products furnished will be in full conformity with the specification, drawing or sample, and agrees that this warranty shall survive delivery, acceptance, and use. Any defect in any product may cause its rejection.

Grambling State University reserves the right to test products for conformance to specifications both prior to and after any award. Vendor shall bear the cost of testing if product is found to be non-compliant. All rejected goods will be held at vendor's risk and expense, and subject to vendor's prompt disposition. Unless otherwise arranged, rejected goods will be returned to the vendor freight collect.

- 16. Delivery:** Vendor is responsible for making timely delivery in accordance with its quoted delivery terms. Vendor shall promptly notify the Grambling State University Purchasing Department of any unforeseen delays beyond its control. In such cases, Grambling State University reserves the right to cancel the order and to make alternative arrangements to meet its needs. All deliveries must go to: **Property and Receiving, 407 Central Ave., Grambling, La 71245.**
- 17. Default of Vendor:** Failure to deliver within the time specified in the bid/award will constitute a default and may be cause for contract cancellation. Where the University has determined the vendor to be in default, Grambling State University reserves the right to purchase any or all goods or services covered by the contract on the open market and to surcharge the vendor with costs in excess of the contract price. Until such assessed surcharges have been paid, no subsequent bids from the defaulting vendor will be considered for award.
- 18. Vendor Invoices:** Invoices shall reference the Grambling State University purchase order number, vendor's packing list/delivery ticket number, shipping/delivery date, etc. Invoices are to be itemized and billed in accordance with the order, show the amount of any prompt payment discount, and submitted on the vendor's own invoice form. Invoices submitted by the vendor's supplier are not acceptable.
- 19. Delinquent Payment Penalties:** Delinquent payment penalties are mandated and governed by Louisiana R.S. 39:1695. Vendor penalties to the contrary shall be null and void, shall have no legal force, and shall not be recognized by Grambling State University in any dispute arising therefrom.
- 20. Assignment of Contract/Contract Proceeds:** Vendor shall not assign, sublet or transfer its contractual responsibilities, or payment proceeds thereof, to another party without the prior written consent and approval of the Grambling State University Purchasing Department. Unauthorized assignments of contract or assignments of contract proceeds shall be null and void, shall have no legal force, and shall not be recognized by Grambling State University in any dispute arising therefrom.
- 21. Contract Cancellation/Termination:** Grambling State University has the right to cancel any contract for cause, in accordance with purchasing rules and regulations, including but not limited to: (1) failure to deliver within the time specified in the contract; (2) failure of the product or service to meet specifications, conform to sample quality or to be delivered in good condition; (3) misrepresentation by the vendor; (4) fraud, collusion, conspiracy or other unlawful means of obtaining any contract with the University; (5) conflict of contract provisions with constitutional or statutory provisions of state or federal law; (6) any other breach of contract.

Grambling State University has the right to cancel any contract for convenience at any time by giving thirty (30) days written notice to the vendor. In such cases, the vendor shall be entitled to payment for compliant deliverables in progress.
- 22. Prohibited Contractual Arrangements:** Per Louisiana R.S. 42:1113.A, no public servant, or member of such a public servant's immediate family, or legal entity in which he has a controlling interest shall bid on or enter into any contract, subcontract, or other transaction that is under the supervision or jurisdiction of the agency of such public servant. See statute for complete law, exclusions, and provisions.
- 23. Equal Employment Opportunity Compliance:** By submitting and signing this bid, vendor agrees to abide by the requirements of the following as applicable: Title VI and VII of the Civil Rights Act of 1964, as amended by the Equal Opportunity Act of 1972; federal Executive Order 11246; federal Rehabilitation Act of 1973, as amended; the Vietnam Era Veteran's Readjustment Assistance Act of 1974; Title IX of the Education Amendments of 1972; the Age Act of 1975; the Americans with Disabilities Act of 1990. Vendor agrees not to discriminate in its employment practices and will render services under any contract entered into as a result of this solicitation without regard to race, color, religion, sex, age, national origin, veteran status, political affiliation, handicap, disability, or other non-merit factor. Any act of discrimination committed by vendor, or failure to comply with these statutory obligations when applicable, shall be grounds for termination of any contract entered into as a result of this solicitation.
- 24. Mutual Indemnification:** Each party hereto agrees to indemnify, defend, and hold the other, the State of Louisiana, any governing board, each party's officers, directors, agents and employees harmless from and against any and all losses, liabilities, and claims, including reasonable attorney's fees arising out of or resulting from the willful act, fault, omission, or negligence of the indemnifying party or of its employees, contractors, or agents in performing its obligations under this agreement, provided however, that neither party hereto shall be liable to the other for any consequential damages arising out of its willful act, fault, omission, or negligence. Certification of No Suspension or Debarment: By signing and submitting this bid, Bidder certifies that its company, any subcontractors, or principals thereof, are not suspended or debarred under federal or state laws or

regulations. A list of parties who have been suspended or debarred by federal agencies is maintained by the General Services Administration and can be viewed on the internet at <https://sam.gov/content/home>

- 25. Substitution of Personnel:** If applicable, the University intends to include in any contract resulting from this IFB the following condition: Substitution of Personnel: If, during the term of the contract, the Contractor or subcontractor cannot provide the personnel as proposed and requests a substitution, that substitution shall meet or exceed the requirements stated herein. A detailed resume of qualifications and justification is to be submitted to the University for approval prior to any personnel substitution. It shall be acknowledged by the Contractor that every reasonable attempt shall be made to assign the personnel listed in the Contractor's bid.
- 26. Insurance Requirements:** Please note insurance requirements section included in these bid specifications. **If applicable** to the services procured in this solicitation, the successful Bidder will be required to furnish a certificate of insurance evidencing required coverages and naming the Grambling State University as an additional insured, and grant a waiver of subrogation on all liability policies.
- 27. Nonperformance:** Successful Bidder is required to perform in strict accordance with all contract specifications, terms, and conditions. Successful Bidder will be advised in writing of nonperformance issues and shall be required to promptly implement corrective actions to ensure contract compliance and to prevent recurrences. In the event the successful Bidder is issued three or more complaints of nonperformance, Grambling State University reserves the right at its sole discretion to cancel the contract with a ten (10) day written notice. Contract cancellations due to nonperformance may be cause to deem vendor non-responsible in future solicitations.

NOTE: The University has a fall break and a Spring Break. Each Break is approximately 4 Days Each.

- 28. No Smoking Campus:** The Successful Bidder shall be responsible for compliance with all University policies, security measures and vehicle regulations. Specifically, the University is a NO SMOKING campus and all prospective Bidders are cautioned that smoking will not be permitted inside or outside on ANY part of this facility at any time. Any employee who is found to be in violation of this policy will be subject to immediate dismissal.
- 29. Non-Exclusivity:** This agreement is non-exclusive and shall not in any way preclude Grambling State University from entering into similar agreements and/or arrangements with other Vendors or from acquiring similar, equal, or like goods and/or services from other entities or sources.
- 30. Contract Amendments:** Requests for contract changes must be made in writing by an authorized agent/signatory of the Vendor and submitted to the Grambling State University Purchasing Department for prior approval. Requests shall include detailed justification and supporting documentation for the proposed amendment.
- Contract revisions shall be effective only upon approval by Grambling State University Purchasing Department and issuance of a formal Grambling State University Contract Amendment. The Vendor shall honor purchase orders issued prior to the approval of any contract amendment as applicable.
- 31. Term of Contract:** The duration of this Contract commences from the date specified herein or date of award notification and continues until University accepts final delivery of all deliverables. Total initial contract period not to exceed **Twelve (12)** months, unless renewal terms are specified in the solicitation documents. All terms of the solicitation shall be firm for the duration of Contract.
- 32. Notification of Fund Appropriation:** The continuation of this contract is contingent upon the appropriation of funds to fulfill the requirements of the contract by the Legislature. If the Legislature fails to appropriate sufficient monies to provide for the continuation of the contract or if such appropriation is reduced by the veto of the Governor or by any means provided in the Appropriations Act to prevent the total appropriations for the year from exceeding revenues for that year or for any lawful purpose and the effect of such reduction is to provide insufficient monies for the continuation of the contract, the contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated.

All Bidders should be aware that our Legislative process is such that it is often impossible to give prior notice of the non-appropriation of funds. Number of Bid Response Copies: Each Bidder must submit one (1) signed original bid to the Office of Purchasing at the mailing address specified in this solicitation document. The original must CONTAIN ORIGINAL SIGNATURES of those company officials or agents duly authorized to sign on behalf of the organization. Bidders may be required to mail in the original documents upon award.

- 33. Prohibition of Discriminatory Boycotts of Israel:** In accordance with LA R.S. 39:1602:1, for any contract for \$100,000 or more and for any contractor with five or more employees, Contractor, or any Subcontractor, shall certify it is not engaging in a boycott of Israel, and shall, for the duration of this contract, refrain from a boycott of Israel.

The State reserves the right to terminate this contract if the Contractor, or any Subcontractor, engages in a boycott of Israel during the term of the contract.

- 34. Pre-Bid Meeting:** **Scheduled for September 16, at 11:00** am in the Purchasing Conference Rm, located on 429 Main Street. Grambling, La 71245. **La. R.S. 38:2212.H; Bidders must attend (and stay at) any mandatory pre-bid meeting.**
- 35. Site Visit/Contract Information:** It is the responsibility of the prospective bidder to visit and examine the jobsite, take measurements to his/her own satisfaction and determine conditions under which work is to be done. Owner will not accept responsibility for conditions which careful examination of premises would have shown existed.
- To visit jobsite and for further information, prospective bidder is to contact the Grambling State University Purchasing Departments at the contacts listed on page 1. It is preferred to have a written record of the correspondence for each site visit request. Please do not contact us by phone to schedule a visit unless you do not receive a response to your email request after 48 hours.
- 36. Piggy Back Clause:** Grambling State University is asking all responding vendors to indicate their willingness to extend the terms of resulting contracts, inclusive of price, to other Louisiana state agencies and/or universities. While this clause in no way commits any state agency and/or university to purchase from the awarded vendor, nor does it guarantee any additional orders will result, it does allow state agencies and/or universities, at their discretion, to make use of the Grambling State University's competitive process (provided said process satisfies their own procurement guidelines) and purchase directly from the awarded contractor. All purchases made by other state agencies and/or universities shall be understood to be transactions between that state agency and/or university and the awarded vendor. Grambling State University shall not be responsible for any such purchases.
- 37. State of Louisiana Contractor's Licenses Requirements:** If a Louisiana Contractor's License Number is Required for the items, work, or services to be performed under this solicitation, then it shall be stated in the bid advertisement that will appear in the Baton Rouge Advocate, and it will be stated in the specifications provided with these bid documents.
- 38. Examination of Bid Documents:** Bidders shall carefully examine the bidding documents and the sites to obtain first-hand knowledge of the scope and the conditions of the work. The submittal of a bid means the Contractor has inspected all elevators and related equipment in the buildings specified and has found elevators to be in a proper working order and satisfactory condition. No additional compensation will be allowed by the owner for failure of such contractor or subcontractor to inform themselves as to the conditions affecting the work
- 39. Errors and Omissions in Bid:** The University will not be liable for any error in the bid. Bidder will not be allowed to alter bid documents after the deadline for bid submission, except under the following condition: The University reserves the right to make corrections or clarifications due to patent errors identified in bids by the University or the Bidder. The University, at its option, has the right to request clarification or additional information from the Bidder.
- 40. Waiver of Administration Informalities:** The University reserves the right, at its sole discretion, to waive administrative informalities contained in any bid.
- 41. Cost of Offer Preparation:** The University is not liable for any costs incurred by prospective Bidders or Contractors prior to issuance of or entering into a Contract. Costs associated with developing the bid, and any other expenses incurred by the Bidder in responding to the ITB are entirely the responsibility of the Bidder, and shall not be reimbursed in any manner by Grambling State University.
- 42. Notice of Intent to Award:** Upon review and approval of the evaluation committee and agency recommendation for award, the Grambling State University will issue a Notice of Intent to Award letter to the apparent successful Bidder. A contract shall be completed and signed by all parties concerned on or before the date indicated. If this date is not met through no fault of the University, the University may elect to cancel the Notice of Intent to Award letter and make the award to the next most advantageous Bidder.

The Purchase Order and the Contractor's specifications will be combined to form the complete contract when the award is made. The Contractor shall be responsible for Contract filing fee with the Lincoln Parish Courthouse.

Any person aggrieved by the proposed award has the right to submit a protest in writing, in accordance with R.S. 39:1671, to the University Purchasing Director, within fourteen (14) days of the award/intent to award.

NOTICE TO VENDORS
LOUISIANA'S HUDSON (SMALL ENTREPRENEURSHIP) AND VETERAN INITIATIVE

The Louisiana Initiative for Small Entrepreneurships (the Hudson Initiative) and the Veteran Initiative (Veteran Small Entrepreneurship) are race and gender neutral goal-oriented programs which encourage State agencies to contract with and encourage contractors who receive contracts from the State to use good faith efforts to utilize certified small entrepreneurships and certified veteran or service-connected disabled veteran owned small entrepreneurships as subcontractors in the performance of the contract. The primary intent of the programs is to provide additional opportunities for Louisiana-based small entrepreneurships that are certified by the Louisiana Department of Economic Development (LED) to participate in contracting and procurement with the State.

Small entrepreneurships that are not currently certified and are interested in participating in procurement and contracting opportunities with the State are encouraged to visit <https://www.opportunitylouisiana.gov/small-business/special-programs-for-small-business/hudson-initiative> or <https://www.opportunitylouisiana.gov/small-business/special-programs-for-small-business/veteran-initiative> for qualification requirements and on-line certification. After certification, businesses are encouraged to register in the [LaGov Supplier Portal](#).

END OF SECTION

DEFINITIONS

Agent - The University's representative in Purchasing Department who is referred to throughout these documents as singular in number.

Contractor - The person/company who contracts with Grambling State University to provide the items, services, or to perform the work as called for on these documents who is referred to as singular in number.

Owner –Grambling State University.

IMPORTANT NOTES:

1. **VENDOR BIDDING ANYTHING OTHER THAN EXACT GOODS/SERVICES SPECIFIED IN THESE SPECIFICATIONS SHOULD SUBMIT DESCRIPTIVE AND ILLUSTRATIVE LITERATURE WITH BID FOR CONSIDERATION OF AWARD. FAILURE TO DO SO MAY BE CAUSE FOR REJECTION OF BID.**
2. **ALL PRICES QUOTED ARE TO REMAIN FIRM UNTIL ALL DELIVERABLE GOODS OR SERVICES ARE RENDERED TO AND ACCEPTED BY GRAMBLING STATE UNIVERSITY.**
3. **IN THE EVENT OF EXTENSION ERRORS, THE UNIT PRICE ON THE BID FORM SHALL PREVAIL.**
4. **GRAMBLING STATE UNIVERSITY ADHERES TO NET 30 PAYMENT TERMS. ALL OTHER PAYMENT TERMS MUST BE DISCLOSED WITH BID. BE ADVISED THAT STRICTER PAYMENT TERMS MAY BE CAUSE FOR REJECTION OF BID.**
5. **QUANTITIES ARE APPROXIMATE AND ARE NOT GUARANTEED BY THE UNIVERSITY. THE UNIVERSITY RESERVES THE RIGHT TO INCREASE OR REDUCE QUANTITY AS NEEDED IF IN THE BEST INTEREST OF THE UNIVERSITY.**
6. **THE UNIVERSITY RESERVES THE RIGHT TO AWARD PROPOSAL ON AN INDIVIDUAL ITEM BASIS, A COMBINATION OF ITEMS BASIS, OR AS A TOTAL PACKAGE TO ONE VENDOR, WHICHEVER IS IN THE BEST INTEREST OF THE UNIVERSITY.**
7. **BID SUBMISSIONS MUST DISCLOSE ALL FEES INCLUDING SHIPPING, HANDLING, FREIGHT, FUEL SURCHARGES, ETC.. NO ADDITIONAL FEES WILL BE ACCEPTED AFTER AWARD.**
8. **FAILURE TO COMPLY WITH ANY MANDATORY REQUIREMENTS SHALL BE CAUSE FOR REJECTION OF BID.**
9. **TAX EXEMPTION: *Grambling State University is exempt from all Louisiana state and local sales and use taxes and will not pay taxes delineated on invoices for this or any other project. Grambling State University is a tax-exempt State Agency. However, that tax-exempt status does not transfer to its contractors, subcontractors, suppliers or vendors for their use in purchasing project-related materials.***

END OF SECTION

MANDATORY BID REQUIREMENTS

Failure to meet all of the listed mandatory requirements will result in rejection of bid without further consideration.

- 1. CERTIFICATION STATEMENT:** The Bidder **must** sign and include the Certification Statement as set forth in solicitation document. The signature of Bidder's Authorized Representative **must be an ORIGINAL signature** - not a typed/electronic signature. Documents signed in the DocuSign™ program are the only exceptions to this policy.
- 2. BID SHEET/FORM:** The Bidder must submit bid on the form herein provided. The proposal must be signed in ink, and blank space(s) should be filled in for every applicable blank in the UNIT PRICE and EXTENDED TOTAL column. Items left blank will not be awarded to that bidder. It is not necessary to bid on all items. However, if you are not bidding on a particular item, or find a blank that is not applicable to your submission, write "NO BID" or "N/A" in the provided space(s). The Bidder must state the UNIT price (written in ink or typewritten) for each item and shall show the total amount for each item based on the quantities listed.
- 3. CONTRACTOR QUALIFICATIONS: REFERENCE LETTERS:** The University reserves the right to verify contractor's qualifications regarding the bid response received, and to request references for verification purposes.
- 4. CERTIFICATE OF INSURANCE:** **If Insurance is required under this solicitation, it will be stated in the advertisement of the solicitation to appear in the Baton Rouge Advocate, and in the specification provided with these bid documents.** Bidder shall submit a certificate of insurance with bid submission or by provide the following information: Policy number, names and addresses of carriers and Agents, amounts of coverage, types of coverage, and effective dates on the bid form enclosed.
- 5. ILLUSTRATIVE MATERIALS: (If Applicable)** Vendor bidding anything other than exact goods/services specified in these specifications should submit descriptive and illustrative literature with the bid for consideration of award. Failure to do so may be cause for rejection of bid.

CONTACT INFORMATION

ELECTRONIC BID SUBMISSIONS (ONLY) *Do not email questions about the bid to this email address.*

purchasingbids@gram.edu

Be sure to include the solicitation number in the subject line.

Do not send your submission to any other University email address.

QUESTIONS/CONCERNS ABOUT SPECIFICATIONS

walkere@gram.edu

Do not email bid submissions this address.

To contact Purchasing by phone: 318-274-3280

CAMPUS DELIVERIES

Please send samples or other associated documents when a hard copy is requested or deemed necessary. By

Mail – Grambling State University

Purchasing Department

PO Box 4269

Grambling LA 71245

By Courier Service: Grambling State University

Purchasing Department

PO Box 4269

Grambling, LA 71245

EXHIBIT E INDEMNIFICATION AGREEMENT

The _____{Contractor/Lessee} agrees to protect, defend, indemnify, save, and hold harmless, Grambling State University, the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees, and volunteers, from and against any and all claims, damages, expenses, and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of

_____{Contractor/Lessee}, its agents, servants, and employees, or any and all costs, expenses and/or attorney fees incurred by _____{Contractor/Lessee} as a result of any claims, demands, suits or causes of action, except those claims, demands, suits, or causes of action arising out of the negligence of the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

_____{Contractor/Lessee} agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits, or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent.

Accepted by _____
Company Name

Signature

Title

Date Accepted _____

Is Certificate of Insurance Attached? ____Yes ____No

Contract No. _____ for

Grambling State University State Agency

PURPOSE OF CONTRACT: _____

**Request for Taxpayer
Identification Number and Certification**

Go to www.irs.gov/FormW9 for instructions and the latest information.

**Give form to the
requester. Do not
send to the IRS.**

Before you begin. For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

Print or type. See Specific Instructions on page 3.	1 Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)	
	2 Business name/disregarded entity name, if different from above.	
	3a Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor <input type="checkbox"/> C corporation <input type="checkbox"/> S corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) Note: Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any) _____ (Applies to accounts maintained outside the United States.)
	3b If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions <input type="checkbox"/>	
	5 Address (number, street, and apt. or suite no.). See instructions.	Requester's name and address (optional)
	6 City, state, and ZIP code	
	7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number											
				-				-			
or											
Employer identification number											
					-						

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person	Date
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

What's New

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

BID BOND
FOR
GRAMBLING STATE UNIVERSITY PROJECTS

Date:

KNOW ALL MEN BY THESE PRESENTS:

That _____ of _____, as Principal, and as Surety, are held and firmly bound unto GRAMBLING STATE UNIVERSITY (Obligee), in the full and just sum of five (5%) percent of the total amount of this proposal, including all alternates, lawful money of the United States, for payment of which sum, well and truly be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally firmly by these presents.

Surety represents that it is listed on the current U. S. Department of the Treasury Financial Management Service list of approved bonding companies as approved for an amount equal to or greater than the amount for which it obligates itself in this instrument or that it is a Louisiana domiciled insurance company with at least an A - rating in the latest printing of the A. M. Best's Key Rating Guide. If surety qualifies by virtue of its Best's listing, the Bond amount may not exceed ten percent of policyholders' surplus as shown in the latest A. M. Best's Key Rating Guide.

Surety further represents that it is licensed to do business in the State of Louisiana and that this Bond is signed by surety's agent or attorney-in-fact. This Bid Bond is accompanied by appropriate power of attorney.

THE CONDITION OF THIS OBLIGATION IS SUCH that, whereas said Principal is herewith submitting its proposal to the Obligee on a Contract for:

NOW, THEREFORE, if the said Contract be awarded to the Principal and the Principal shall, within such time as may be specified, enter into the Contract in writing and give a good and sufficient bond to secure the performance of the terms and conditions of the Contract with surety acceptable to the Obligee, then this obligation shall be void; otherwise this obligation shall become due and payable.

PRINCIPAL (BIDDER)

SURETY

BY: _____
AUTHORIZED OFFICER-OWNER-PARTNER

BY: _____
AGENT OR ATTORNEY-IN-FACT(SEAL)

INSURANCE-STATEMENT

This is to certify that we carry the Workmen's Compensation, Employer's Liability Insurance, General Liability Insurance, and Automobile Liability Insurance as outlined above with:

Liability Insurance Company: _____

Auto Liability Company Insurance: _____

Workers Compensation Insurance Company: _____

Grambling State University to be named as additional insured on Insurance Certificate provided for this contract for Liability Coverage and Auto Liability Coverage. Grambling State University shall be granted a waiver of subrogation for all Insurance Policies.

Business Name: _____

Business Address: _____ Phone No.: _____

Authorized Signature of Bidder: _____ Date: _____

Printed Name: _____ Title: _____

Email Address: _____

CERTIFICATION STATEMENT

The undersigned hereby acknowledges she/he has read and understands all requirements and specifications of the Invitation for Bid (IFB), including any attachments.

OFFICIAL CONTACT. The University requests that the Bidder designate one person to receive all documents and the method in which the documents are best delivered. Identify the Contact name and fill in the information below: (Print Clearly)

Date	_____ Official Contact Name:	
A.	E-mail Address	
B.	Telephone Number with area code:	(_____) _____

Bidder certifies that the above information is true and grants permission to the University to contact the above-named person or otherwise verify the information provided. By its submission of this Proposal and authorized signature below, Bidder certifies that:

1. The information contained in its response to this IFB is accurate;
2. Bidder complies with each of the mandatory requirements listed in the IFB and will meet or exceed the requirements specified therein; Bidder agrees to provide all tasks, services, and deliverables listed in Scope of Services for the total cost stated on Bid Form
3. Bidder accepts the procedures, evaluation criteria, mandatory contract terms, and all other administrative requirements set forth in this IFB.
4. Bidder confirms that its bid will be considered valid until award is made.
5. In making this bid, each Bidder represents that: They have read and understand the bid documents and the bid is made in accordance herewith, and the bid is based upon the specifications described in the bid documents without exception.
6. Bidder certifies, by signing and submitting a proposal for \$25,000 or more, that their company, any subcontractors, or principals are not suspended or debarred by the General Services Administration (GSA) in accordance with the requirements in OMB Circular A-133. (A list of parties who have been suspended or debarred can be viewed via the internet at <https://sam.gov/content/home>.)
7. **FEDERAL CLAUSES, IF APPLICABLE:** Should Federal Funds be utilized in this procurement transaction, the following clauses apply:

ANTI-KICKBACK CLAUSE: The contractor hereby agrees to adhere to the mandate dictated by the Copeland "Anti-Kickback" Act which provides that each contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the completion of work, to give up any part of the compensation to which he is otherwise entitled.

CLEAN AIR ACT: The contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders or requirements issued under Section 306 of the Clean Air Act which prohibits the use under non-exempt Federal Contracts, Grants or Loans of Facilities included on the EPA list of Violating Facilities.

ENERGY POLICY AND CONSERVATION ACT: The contractor hereby recognizes the mandatory standards and policies relating to energy efficiency which are contained in the State Energy Conservation Plan issued in compliance with the Energy Policy and Conservation Act (P.L. 94-163).

CLEAN WATER ACT: The contractor hereby agrees to adhere to the provisions which require compliance with all applicable standards, orders or requirements issued under Section 508 of the Clean Water Act which prohibits the use under non-exempt Federal Contracts, Grants or Loans of Facilities included on the EPA list of Violating Facilities.

ANTI-LOBBYING AND DEBARMENT ACT: The contractor will be expected to comply with Federal Statutes required in the Anti Lobbying Act and the Debarment Act.

Professional Job Title:		
Official Company Name:		
Federal Identification Number:		
Street Address:		
City:	State:	Zip:

SIGNATURE of Bidder's Authorized Representative: _____
(Signature MUST be HAND SIGNED and should be in Blue ink)

Date: _____

LOUISIANA UNIFORM BID FORM

TO: Grambling State University_

BID FOR: Interior Renovation of Basement Level – T.L. James Hall

**Purchasing Dept
GSU P.O. Box 4269.
Grambling, La 71245**

Bid No.: 50018-260013

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: **Grambling State University dated: September 11, 2025.**

TOTAL BASE BID: For all work required by the Bidding Documents for the **we bid the sum of:**

_____ Dollars (\$ _____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

FAX NO.: _____ **EMAIL ADDRESS:** _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

AUTHORIZED SIGNATURE OF BIDDER *: _____

DATE: _____

THE FOLLOWING ITEMS ARE TO BE INCLUDED WITH THE SUBMISSION OF THIS LOUISIANA UNIFORM BID FORM:

*The Unit Price Form shall be used is the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

****A CORPORATE RESOLUTION OR WRITTEN EVIDENCE** of the authority of the person signing the bid as prescribed by LA R.S. 38.2212(B)(5).

BID SECURITY in the form of a bid bond, certified check email document from the Surety Company as prescribed by LA R.S.

38:2218.A is attached to and made a part of this bid. If a bid bond is provided it shall be on the attached form and only on the attached form.

I acknowledge that no work shall be subcontracted _____ (Initial)

BID SUBMISSION CHECKLIST

___ Certification statement w/original signature

___ Bid prices provided on the bid sheet(s) provided

___ Certificate of Insurance

___ Illustrative literature for items offered as equivalent

BID SUBMISSION DEADLINE:

Bid submissions for this solicitation are **due on September 24, 2025 by 2:00PMCST** – must be received electronically at purchasingbids@gram.edu. There are no exceptions to this deadline.

BID OPENING:

The public bid opening will take place on 9/24/2025 at **2:05PMCST** on Zoom, which is available for viewing by registering at: <https://us06web.zoom.us/j/88021161133?pwd=Ba9K16EJOubdL76bdebhW5D2Qflgis.1>

ZOOM MEETING ID: 880 2116 1133

PASSWORD: 063984

Opening of the bid submissions begins at five (5) minutes past the hour.

For further information about the bid or to view job/delivery site, prospective bidder is to email the Purchasing Staff Members Contact Information provided on page 1

BID SHEET (continued)

PAYMENT OF TAXES

Grambling State University is exempt from all Louisiana state and local sales and use taxes and will not pay taxes delineated on invoices for items, services, or work under this solicitation or any other project. Grambling State University is a tax-exempt State Agency. However, that tax-exempt status does not transfer to its contractors, subcontractors, suppliers or vendors for their use in purchasing materials to be procured under this solicitation.

ADDENDA ACKNOWLEDGEMENT(S)

BIDDER ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA (if applicable):

ADDENDUM NO. ___ DATED: _____

ADDENDUM NO. ___ DATED: _____

ADDENDUM NO. ___ DATED: _____

FIRM NAME _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

SIGNED BY (signature) _____

SIGNED BY (printed) _____

By submitting your bid, you are acknowledging that you understand and agree that your company is capable of supplying the products/services in the timeline you have provided for the price(s) submitted in your bid.

Grambling State University reserves the right to reject any or all bids submitted.

STANDARDIZED IFB LANGUAGE

1. **CHANGES IN THE WORK:** A Change Order is a written order to the Contractor signed by the Owner, issued after execution of the Contract, authorizing a Change in the Work or an adjustment in the Contract Sum or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum or the Contract Time. Any Change Order not signed by the Owner will be considered null and void.

The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order and shall be performed under the applicable conditions of the Contract Documents.

When the Change Order is negotiated it shall be fully documented and itemized as to cost, including material quantities, material costs, insurance, employee benefits, other related costs, profit and overhead, and will be processed in accordance with LA R.S. 38:2222.

2. **QUALIFICATION REQUIREMENTS FOR COMPANIES SUBMITTING A BID:** All contractors submitting a bid for this contract shall meet these requirements listed below. Please include documentation in your bid submission that addresses each requirement. Submit the Bid including Unit Prices, Equipment List Breakout, executed & sworn; obtain and maintain throughout the term of the Contract, all required licenses, permits, certificates, insurances, performance and payment bonds, and agency signoffs to perform the Contract; demonstrate that it is an organization doing business for a minimum of three years prior to the Bid Opening Date; Must be an authorized dealer for all the Equipment; provide Bid Security – either a 5% percent Bid Bond.
3. **PERFORMANCE BOND LABOR AND MATERIAL PAYMENT BOND:** Performance and Payment Bonds shall be required on projects with an expected cost greater than \$50,000. Performance and Payment Bonds, when required, shall be provided in an amount of 50% of the contract price. Performance and Payments Bonds shall be required by the successful bidder.

Any surety bond required shall be written by a surety or insurance company currently on the U. S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register. For any Public Works projects, no surety or insurance company shall write a bond which is in excess of the amount indicated as approved by the U. S. Department of the Treasury Financial Management Service list. The surety bond written for a Public Works project shall be written by a surety or insurance company that is currently licensed to do business in the State of Louisiana. **PLEASE NOTE THAT A BID BOND MUST BE SIGNED BY THE AGENT OR ATTORNEY-IN-FACT OF THE SURETY.**

The bidder shall require the attorney in fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of his power of attorney indicating the monetary limit of such power.

Contractor shall be licensed and certified as required by the State of Louisiana Secretary of State, and all other applicable agencies. Documentation to be provided within five (5) days after receipt of request from the University.

Contractor awarded the bid shall provide a copy of their insurance certificate indicating proof of coverage as required in the insurance section of these bid within five (5) days from receipt of request.

4. **SUBSTITUTIONS:** Each bidder represents that his bid is based upon the materials and equipment described in the bidding documents.
5. **MANUFACTURER'S NUMBERS OR TRADE NAMES:** Where a manufacturer's product is named or specified, it is understood that "or equal" shall apply, whether stated or not. Such name and number is meant to establish the standard of quality desired and does not restrict bidders to the specific brand, make, manufacturer, or specification named; and are set forth and convey to prospective bidders the general style, type, character, and quality of product desired; and that equal products will be acceptable. Grambling State University shall be sole judge as to whether or not the material is equal to that specified.
6. **EXAMINATION OF BIDDING DOCUMENTS:** Each bidder shall examine the bidding documents carefully and, no later than seven days prior to the date for receipt of bids, shall make written request to the Owner for interpretation or

correction of any ambiguity, inconsistency or error therein which he may discover. Any interpretation or correction will be issued as an Addendum by the Owner. Only a written interpretation or correction by Addendum shall be binding. No bidder shall rely upon any interpretation or correction given by any other method.

7. **INQUIRY PROCESS:** Contractors shall direct all inquiries, requests for information, requests for clarification, etc. in writing to the Grambling State University Purchasing Department. Inquiries may be emailed to Erin Walker at walkere@gram.edu. **The last day to receive inquiries shall be by the close of business September 16, 2025.**
8. **CONTRACT COORDINATORS FOR THE UNIVERSITY:** The University will assign a contract coordinator for this contract. The University may assign one or more University employees to supervise and or coordinate work activities to be performed under this contract. The Contractor awarded the bid shall be provided the name(s) of University employee supervisors.
9. **AWARDS:** Awards may not be made to any person, firm, or company in default of any contract. Said person, firm, or company shall be considered non-responsible bidders and may be reinstated and awards made to them only after they have given evidence of good faith and have satisfactorily completed their obligations.
10. **PUBLICIZING AWARDS:** Written notice of award shall be sent to the successful bidder. In procurement over \$50,000, each unsuccessful bidder shall be notified of the award provided that he/she submitted with his/her bid in and email requesting this information to purchasingbids@gram.edu. Notice of award will be made a part of the procurement file.
11. **RIGHT TO PROTEST:** Any person who is aggrieved in connection with the solicitation or award of a contract shall protest to the Director Purchasing. Protests with respect to a solicitation shall be submitted in writing at least (2) two days prior to the opening of bids on all matters except housing of state agencies, their personnel, operations, equipment, or activities pursuant to R.S. 39:1643 for which such protest shall be submitted at least (10) ten days prior to the opening of bids. Protests with respect to the award of a contract shall be submitted in writing within (14) fourteen days after contract award.
12. **AUTHORITY TO RESOLVE PROTESTS:** Prior to the commencement of an action in court concerning any controversy, the Director of Purchasing or his/her designee shall have the authority, to resolve the protest of any aggrieved person concerning the solicitation or award of a contract. This authority shall be exercised in accordance with regulations.
13. **REJECTION OF BIDS:** The Bidder acknowledges the right of the University to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of the University to reject a bid if the Bidder failed to furnish any required bid security, or to submit the data required by the bidding documents, or if the bid is in any way incomplete or irregular.
14. **NORMAL / ROUTINE SCHEDULE:** The Contractor shall provide complete services Monday thru Thursday every week, from 8:00 AM to 4:00 PM.
15. **CONTRACTOR'S LICENSE:** On any bid amounting \$50,000 or more, the Contractor shall certify that she/he is licensed under Act 377 of the 1976 Louisiana Regular Legislative Session and show the contractor license number and the bid number on the front portion of the envelope; except projects financed, partially or wholly, with Federal Funds, provided that any successful Bidder before signing Contract thereon, files application for a license and pays the fee as provided in this Act and complies with all terms and provisions of this Act and with the rules and regulations of the Licensing Board.

A subcontractor who wishes to bid or perform commercial work where the total cost of the project including labor and materials for the following must be licensed:
 - \$50,000 or more for major and specialty classifications
 - \$10,000 or more for electrical, mechanical, and plumbing
 - \$1 or more for hazardous
16. **CONTRACTOR'S AFFIDAVIT:** In accordance with the Louisiana R.S. 38:2190 -2220, if the Contract is awarded to the successful Bidder, the Bidder shall, at the time of the signing of the Contract, execute the Contractor's Affidavit included in the Contract Documents.
17. **INTEREST:** There shall be no payment of interest on money owed.
18. **SECURITY REQUIREMENTS:** The University may allow the contractor to store tools, equipment, materials, supplies,

etc. on site at University facilities, however, the University in no way warrants the security of any of this property. The Contractor shall be responsible for security of their property. The University may allow the Contractor to store tools, equipment, supplies, and materials on site at University facilities in designated storage areas. The University reserves the right to change these designated areas as needed and additionally the University is not required to provide these storage areas. The Contractor shall be required to keep all designated areas in a neat / orderly manner. The Contractor shall be required to provide insurance coverage for all equipment stored on site at Grambling. The contractor assumes all risk with storing tools, equipment, and materials on site at University facilities. The University shall not be responsible for theft, damage, or other harm to any property of the contractor securing any property.

19. **DAMAGES TO FACILITIES:** Contractor shall be responsible for all damages to the existing site, facilities, furniture, and equipment that are caused by this project. The contractor shall carefully document existing site conditions and existing damages prior to commencing work. The contractor shall repair all damage to its original, undamaged condition prior to completing this project

20. **CONTRACTOR EMPLOYEE REQUIREMENTS:** Contractor shall provide a sufficient amount of adequately trained staff to perform all required services in a timely manner.

21. **Supervision and Professional Conduct-**

The Supervisor shall be responsible for communicating work schedules with the University's designated contract coordinator.

The Supervisor shall be present at all times when any contractor personnel are working at Grambling. The contractor shall designate employees who may fill in for the supervisor if the supervisor is absent for any reason. The University shall be notified by telephone and email as soon as possible if the normal supervisor will be absent. This notification shall be made no later than one hour after the normal work day schedule begins. The contractor shall provide complete contact information for the supervisors and the personnel designated as "back up" supervisors. The contractor shall provide the supervisors with a mobile cellular phone and shall provide the University with the phone number for the cellular phone so that the University can reach the supervisor at any time.

The University reserves the right to require the contractor to remove any contract employee who is not dressed appropriately or who is not taking care of their personal hygiene from any or all buildings employed under the contract when the University deems it to be in the University's best interest. Contractor's employees shall maintain a neat, clean, and professional appearance at all times. Contractor's employees shall wear clothing identifying the name of their company. The contractor shall be responsible for furnishing a replacement employee who also shall meet all previously stated requirements in the event of sickness or absence of the regular worker and notify the University contract coordinator of that replacement.

Contractor's employees will be able to use McCall Dining Hall for lunch. Pricing varies during the summer. The contractor, sub-contractors, material suppliers, and all workers associated with the project shall use University facilities such as restrooms, break rooms, vending machines, etc. The contractor shall supply a portable restroom for their employees to use.

Contractor's employees shall adhere to the university's tobacco-free policy. See GSU's tobacco use policy for detailed information at <https://www.gram.edu/student-life/judicial-affairs/docs/Tobacco-Free%20Policy-2013-1.pdf>

22. **SUPPLIES, MATERIALS, TOOLS, AND EQUIPMENT REQUIRED FOR THIS CONTRACT:** The Contractor must provide all supplies, materials, tools, equipment, etc. necessary to complete the requirements of this contract. In no case will the University be required to provide / supply any of these items. The tools and equipment provided shall be maintained in optimum condition at all times. Specifically, the tools and equipment provided shall include but not be limited to. Equipment and tools used for this contract shall be professional equipment / tools in good working condition. Contractor shall utilize equipment and tools that provide the least amount of interruption to normal building operations (very noisy equipment shall not be used, equipment that creates objectionable fumes shall not be used, etc.). The University reserves the right to deny the Contractor use of a certain tool or piece of equipment if the University deems that tool or piece of equipment to cause an unacceptable interruption. Contractor must have an adequate supply of appropriate equipment and tools to efficiently provide service to all facilities included in this contract. Furthermore, the Contractor must have backup equipment / tools that are immediately ready for use in the event that the normally used equipment / tool fails to operate, is lost / stolen, etc. A delay in service is not acceptable due to equipment / tool failure or loss.

23. SUPPLIES / MATERIALS: Contractor shall supply and provide all needed materials to complete the scope of services. The quality of these materials shall meet or exceed the quality of materials currently being used at these facilities. Contractors are encouraged to inspect each facility prior to submitting a bid to ensure that the quality of materials in their bid meets or exceeds the quality of materials I supplies currently used.

24. SAFETY / ENVIRONMENTAL / PUBLIC HEALTH COMPLIANCE REQUIREMENTS: The Contractor shall emphasize that safety is the most important part of this contract. The goal of the contract is to provide safe and sanitary facilities for the University community. We want to ensure that the Contractor has a proactive approach to working safely and a written safety program that their employees are trained on. Additionally, we expect the Contractor to strictly comply with all applicable rules, guidelines, laws, requirements, etc. The University shall require the Contractor to take immediate action to remedy any deficiencies / areas of non-compliance.

Occupational Safety and Health Act (OSHA) Compliance - the Contractor shall meet or exceed all OSHA requirements, rules, laws, guidelines. Environmental Protection Agency (EPA) and Louisiana Department of Environmental Quality (LDEQ) Compliance the Contractor shall meet or exceed all EPA and / or LDEQ requirements, rules, laws, guidelines, etc.

Safety Program - the Contractor shall include a copy of their written safety program with their bid submission that covers all policies and procedures that pertain to compliance with safety / OSHA requirements.

Material Safety Data Sheets (MSDS) -the Contractor must keep a printed copy of a material safety data sheet for each chemical used to complete the requirements of this contract. The MSDS must be readily available and easily accessible to all employees.

25. PAYMENTS AND COMPLETION and SUBSTANTIAL COMPLETION: The Owner will issue a NOTICE OF ACCEPTANCE for the Contractor to record with the Clerk of Court in Lincoln Parish.

26. FINAL COMPLETION AND FINAL PAYMENT: The Contract is to provide that the contractor is not to be paid more than ninety percent (90%) of the amount of the contract upon completion of the work. The Contractor shall record the NOTICE OF ACCEPTANCE with the Lincoln Parish Clerk of Court and shall furnish a CLEAR LIEN CERTIFICATE from the Clerk of Court within forty-five days after recordation of NOTICE OF ACCEPTANCE. At that time, the remaining ten percent (10%) will be paid.

29. LIQUIDATED DAMAGES: The Owner will suffer financial loss if the Project is not substantially complete on the date set forth in the CONTRACT DOCUMENTS. The Contractor (and/or Surety) shall be liable for and shall pay to the Owner Liquidated Damages for each calendar day of delay until the work is Substantially Complete.

The Completion Time stated in Consecutive Calendar Days and the Liquidated Damages stated in (\$250) two-hundred and fifty Dollars per Day are listed in the PROPOSAL FORM.

30. PRICING REQUIREMENTS: Pricing for all items shall be a complete, turnkey price and shall include but is not limited to: labor, equipment, tools, materials, supplies, insurance, permitting, taxes, and shipping.

31. TAXES: Applicable taxes are to be included in lump sum bid.

32. INVOICING / PAYMENT TERMS: The contractor will be required to submit an itemized monthly invoice, to Accounts Payable email address acctpayable@gram.edu. Monthly payments will be made by the Agency within approximately thirty (30) days after receipt of a properly executed invoice, and approval by the Agency.

All invoices must list the following information: the contract purchase order number, dates of services performed, building name and elevator number if applicable, a brief explanation of repair including any parts replaced. Invoices submitted without the requested documentation will not be approved for payment until the required information is provided.

STANDARDIZED INSURANCE REQUIREMENTS FOR STATE AGENCY CONTRACTS

EXHIBIT A INSURANCE AND INDEMNIFICATION REQUIREMENTS FOR CONTRACTORS

The Contractor shall purchase and maintain for the duration of the contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, its agents, representatives, employees or subcontractors.

A. MINIMUM SCOPE AND LIMITS OF INSURANCE

1. **WORKER COMPENSATION:** Workers Compensation insurance shall be in compliance with the Workers Compensation law of the State of the Contractor's headquarters. Employers Liability is included with a minimum limit of \$500,000 per accident/per disease/per employee. If work is to be performed over water and involves maritime exposure, applicable LHWCA, Jones Act, or other maritime law coverage shall be included and the Employers Liability limit increased to a minimum of \$1,000,000. A.M. Best's insurance company rating requirement may be waived for workers compensation coverage only.
2. **COMMERICAL GENERAL LIABILITY:** Commercial General Liability insurance, including Personal and Advertising Injury Liability, shall have a minimum limit per occurrence of \$1,000,000 and a minimum general aggregate of \$2,000,000. The Insurance Services Office (ISO) Commercial General Liability occurrence coverage form CG 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. Claims-made form is unacceptable.
3. **AUTOMOBILE LIABILITY:** Automobile Liability Insurance shall have a minimum combined single limit per occurrence of \$1,000,000. ISO form number CA 00 01 (current form approved for use in Louisiana), or equivalent, is to be used in the policy. This insurance shall include third-party bodily injury and property damage liability for owned, hired and non-owned automobiles.

B. **DEDUCTIBLES AND SELF-INSURED RETENTIONS:** Any deductibles or self-insured retentions must be declared to and accepted by the Agency. The Contractor shall be responsible for all deductibles and self-insured retentions.

C. **OTHER INSURANCE PROVISIONS:** The policies are to contain, or be endorsed to contain, the following provisions:

1. **General Liability and Automobile Liability Coverages**

- a. The Agency, its officers, agents, employees and volunteers shall be named as an additional insured as regards negligence by the contractor. ISO Form CG 20 10 (current form approved for use in Louisiana), or equivalent, is to be used when applicable. The coverage shall contain no special limitations on the scope of protection afforded to the Agency.
- b. The Contractor's insurance shall be primary as respects the Agency, its officers, agents, employees and volunteers. Any insurance or self-insurance maintained by the Agency shall be excess and non-contributory of the Contractor's insurance.
- c. Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Agency, its officers, agents, employees and volunteers.
- d. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the policy limits.
- e. All property losses caused by the actions of the Contractor shall be adjusted with and made payable to the Agency.
- f. Neither the acceptance of the completed work nor payment shall release the Contractor from the insurance requirements and indemnification agreement obligations.
- g. Additional insurance may be required on an individual basis for hazardous activities and specific service agreements. If such additional insurance is required for a specific contract, that requirement should be added to the list of required coverages found in the appropriate Exhibit.
- h. If the Contractor does not continue to comply with all of the insurance requirements at any time during the contract or at contract renewal, the Agency has the following options:
 - Payments to the Contractor may be withheld until the requirements have been met;

- The Agency may pay any renewal policy premiums and withhold such payments from any monies due the Contractor;
- The Agency may suspend, discontinue or terminate the contract.

2. **Workers Compensation and Employers Liability Coverage**

The insurer shall agree to waive all rights of subrogation against the Agency, its officers, agents, employees and volunteers for losses arising from work performed by the Contractor for the Agency.

3. **All Coverages**

- Coverage shall not be canceled, suspended, or voided by either party (the Contractor or the insurer) or reduced in coverage or in limits except after 30 days written notice has been given to the Agency. Ten-day written notice of cancellation is acceptable for non-payment of premium. Notifications shall comply with the standard cancellation provisions in the Contractor's policy.
- Neither the acceptance of the completed work nor the payment thereof shall release the Contractor from the obligations of the insurance requirements or indemnification agreement.
- The insurance companies issuing the policies shall have no recourse against the Agency for payment of premiums or for assessments under any form of the policies. Any failure of the Contractor to comply with reporting provisions of the policy shall not affect coverage provided to the Agency, its officers, agents, employees and volunteers.

- D. **ACCEPTABILITY OF INSURERS:** All required insurance shall be provided by a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located. Insurance shall be placed with insurers with a A.M. Best's rating of A:-VI or higher. This rating requirement may be waived for workers compensation coverage only.

If at any time an insurer issuing any such policy does not meet the minimum A.M. Best rating, the Contractor shall obtain a policy with an insurer that meets the A.M. Best rating and shall submit another Certificate of Insurance as required in the contract.

- E. **VERIFICATION OF COVERAGE:** Contractor shall furnish the Agency with Certificates of insurance reflecting proof of required coverage. The Certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The Certificates are to be received and approved by the Agency before work commences and upon any contract renewal thereafter.

In addition to the Certificates, Contractor shall submit the declarations page and the cancellation provision endorsement for each insurance policy. The Agency reserves the right to request complete certified copies of all required insurance policies at any time.

Upon failure of the Contractor to furnish, deliver and maintain such insurance as above provided, this contract, at the election of the Agency, may be suspended, discontinued or terminated. Failure of the Contractor to purchase and/or maintain any required insurance shall not relieve the Contractor from any liability or indemnification under the contract.

- F. **SUBCONTRACTORS:** Contractor shall include all subcontractors as insureds under its policies OR shall be responsible for verifying and maintaining the Certificates provided by each subcontractor. Subcontractors shall be subject to all of the requirements stated herein. The Agency reserves the right to request copies of subcontractor's Certificates at any time.

- G. **WORKERS COMPENSATION INDEMNITY:** In the event Contractor is not required to provide or elects not to provide workers compensation coverage, the parties hereby agree that Contractor, its owners, agents and employees will have no cause of action against, and will not assert a claim against, the State of Louisiana, its departments, agencies, agents and employees as an employer, whether pursuant to the Louisiana Workers Compensation Act or otherwise, under any circumstance. The parties also hereby agree that the State of Louisiana, its departments, agencies, agents and employees shall in no circumstance be, or considered as, the employer or statutory employer of Contractor, its owners, agents and employees. The parties further agree that Contractor is a wholly independent contractor and is exclusively responsible for its employees, owners, and agents. Contractor hereby agrees to protect, defend, indemnify and hold the State of Louisiana, its departments, agencies, agents and employees harmless from any such assertion or claim that may arise from the performance of this contract.

- H. **INDEMNIFICATION/HOLD HARMLESS AGREEMENT:** Contractor agrees to protect, defend, indemnify, save, and hold harmless, Grambling State University, the State of Louisiana, all State Departments, Agencies, Boards and Commissions, its officers, agents, servants, employees, and volunteers, from and against any and all claims, damages, expenses, and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur, or in any way grow out of, any act or omission of Contractor, its agents, servants, and employees, or any and all costs, expenses and/or attorney fees incurred by Contractor as a result of any claims, demands, suits or causes of action, except those claims,

demands, suits, or causes of action arising out of the negligence of Grambling State University, the State of Louisiana, all State Departments, Agencies, Boards, Commissions, its officers, agents, servants, employees and volunteers.

Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands, suits, or causes of action at its sole expense and agrees to bear all other costs and expenses related thereto, even if the claims, demands, suits, or causes of action are groundless, false or fraudulent.

CONSTRUCTION DOCUMENTS SPECIFICATION MANUAL

REMODEL TO CLASSROOM IN:

T.L. JAMES HALL

GRAMBLING STATE UNIVERSITY

Grambling, Louisiana

ARCHITECT

Architecture+

300 Washington Street - Suite 400

Monroe, LA 71201

Joseph L. Cassiere, Architect of Record

Architecture+ Project Number : 25035.00

PROJECT CONTACT INFORMATION

REMODEL TO CLASSROOM IN:

T.L. JAMES HALL

GRAMBLING STATE UNIVERSITY

Grambling, Louisiana

Architecture+

PROJECT CONTACTS

ARCHITECT

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Monroe, LA 71201
Project Manager Kirk Miller
318-327-7654 kmiller@archplus.com

MECHANICAL / HVAC & PLUMBING ENGINEER

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V: 318-322-0551
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OWNER

Grambling State University Damien Chatman
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V: 318-274-3136
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E: chatmand@gram.edu

REMODEL TO CLASSROOM IN:
T.L. JAMES HALL GRAMBLING STATE
UNIVERSITY
GRAMBLING, LOUISIANA

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GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

DESCRIPTION OF PROJECT:

The project is the interior renovation of an existing 4,644 sq. Ft. Basement level at T.L. James Hall at Grambling State University in Grambling, Louisiana. Demolition work includes removal of existing welding units with associated exhaust systems, removal of existing VCT flooring in the classroom, and removal of burglar bars at all windows and doors. Renovation will involve construction of interior C.M.U. wall partitions in the laboratory space, cleaning and re-finishing of interior walls, floors and ceilings throughout, and installation of a powered garage door operator with required accessories for the existing sectional overhead door. Electrical work will include replacement of existing light Fixtures, additional electrical power and data outlets, and electrical power for new HVAC system. Mechanical work will include the termination of existing compressed air lines above the ceiling, replacement of an existing sink, and installation of a new HVAC unit to serve a 3,000 sq. ft. portion of the basement.

QUALITY ASSURANCE

General: It is the intent of the Owner and the Project Manual to conform with the AMERICANS WITH DISABILITIES ACT OF 2010.

WORK SEQUENCE

General: Coordinate construction schedule and operations with Architect and Owner.

CONTRACTS

General Contract: Construct Work of this Project under a single fixed-price Contract.

Contracts: Cooperation within this Contract is imperative. Each subcontractor involved in this project shall:

- A. Cooperate with all other trades and Owner Personnel;
- B. Coordinate work;
- C. Notify all concerned before beginning any phase of the Work;
- D. Provide access to its work at the various stages of construction as required;
- E. Confer with all other trades to ascertain that their work is in place;
- F. Protect work of other trades during all phases of operations.

English Speaking Superintendent and Trade Foreman: General Contractor shall employ a Job Superintendent that speaks and writes fluent English. Each Trade shall have a foreman or translator on the jobsite at all times who speaks and writes fluent English.

Coordination of Work: The coordination of work includes, but is not limited to the following:

- A. This contract will be completed in one phase.
- B. Coordinate Work of the various specification sections to assure efficient and orderly sequences of installation of construction elements, with provisions for accommodating items to be installed by others, and at a later date or during the required installation.
- C. Coordinate requirements and installation of electrical work and mechanical and plumbing which are indicated on drawings.
- D. Coordinate electrical work with the General Contractor and provide holes in the top double plate for the cable installation.
- E. In finished areas, conceal pipes, ducts and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

CONTRACTOR'S USE OF PREMISES

General: Contractors shall limit their use of the premises to construction activities in areas indicated.

- A. T.L. James Hall shall remain open and in operation during all construction. Contractor shall coordinate construction activities with the owner.
- B. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
- C. Keep driveways and entrances serving the premises clear and available to the Owner at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

Storage: Contractor assumes full responsibility for protection and safekeeping of products under this Contract and stored on Project site. Contractor shall move any stored products, under this Contractor's control, which interfere with operations of Owner and/or separate contractor.

Additional Storage: Contractor shall obtain and pay for use of additional storage or work areas needed for construction operations.

OWNER OCCUPANCY

Note: Contractor shall at all times conduct his operations to insure least inconvenience to general public and Owner.

WORK RESTRICTIONS

Existing Utility Interruptions: Do not interrupt utilities serving facilities outside the Work Limits.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

* * * * *

End of Section 01 11 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

SUMMARY

This Section specifies administrative and procedural requirements for handling and processing Requests for Information and Contract modifications.

REQUESTS FOR INFORMATION AND SUPPLEMENTAL INSTRUCTIONS

Definition: Requests for Information (RFI), is a formal process used during bidding and during construction to facilitate communication between the Contractor and the Architect with regard to request for information and clarification of the intent of the Contract Documents.

- A. Request for Information form may be used during bidding phase. Reference Sheet 01-26- 00-4 for the form.

Procedure:

- A. Conditions Requiring Clarification of the Contract Documents: Submit a Request for Information to the Architect.
 - 1. Submit Requests for Information from Contractor's office or field office only. Requests for Information submitted directly from subcontractors or suppliers will not be accepted.
 - 2. Generate Requests for Information by one source per project and number sequentially.
 - 3. Submit one request for information per form.
- B. The Architect will review formal requests from the Contractor with reasonable promptness and the Contractor will be notified in writing of decisions made, via the RFI form.
 - 1. The Architect's response shall not be considered as a Change Order or Change Directive, nor does it authorize changes in the Contract Sum or Contract Time.
- C. The Contractor shall maintain a log of Requests for Information sent to and responses from the Architect.

RFI Form: Attached at the end of this Section is a "go by" Request for Information form. Submit requests for information on an RFI form with all information on the attached "go by" form on the Contractors letterhead. The architect will not respond to requests for information unless this format is utilized.

- A. Where submittal form does not provide space needed to complete information, additional sheets may be attached.

MINOR CHANGES IN THE WORK

The Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

PROPOSAL REQUEST

Owner-Initiated Proposal Request: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

- A. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
- B. Within time specified in Proposal Request, but in no event more than 20 calendar days after receipt of Proposal Request, submit a written quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Proposal Request shall include:
 - 1. A list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made.
 - 2. Applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 - 3. The cost of labor and supervision required or eliminated directly attributable to the change based on the hourly wage rates found elsewhere in these documents.
 - 4. A written statement as to the impact on the construction schedule.

Contractor-Initiated Proposal Request: If latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect which:

- A. No more than 20 calendar days after unforeseen conditions are revealed, include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
- B. Include a list of quantities of products required or eliminated and unit costs, which total the amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
- C. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
- D. Include cost of labor and supervision required or eliminated directly attributable to the change.
- E. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times and activity relationship. Use available total float before requesting an extension of the Contract Time.
- F. Comply with requirements in Section 01 62 00 "Substitutions and Product Options" if the proposed change requires substitution of one product or system for product or system specified.

CHANGE ORDER PROCEDURES

On Owner's approval of a Proposal Request, the Contractor will issue a Change Order for signatures of the Owner and Architect on an AIA Change Order form G701 – 2017.

CONSTRUCTION CHANGE DIRECTIVE

Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 or similar form. Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

- A. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

- A. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

The following information to be on the Contractor's letterhead:

REQUEST FOR INFORMATION

DATE:		RFI #:	
TO:		PROJECT NAME:	
COMPANY:		LOCATION:	
FROM:			
TITLE:		SPEC SECTION:	
PHONE:		DRAWING / DETAIL:	
EMAIL:		Attachments:	

INFORMATION REQUESTED:

PLEASE RESPOND BY:

REPLY:	

* * * * *

End of Section 01 26 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

SUMMARY

This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

Coordinate: Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

- A. The Contractor's Construction Schedule shall be submitted with each Application for Certificate for Payment.

SCHEDULE OF VALUES

Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

Correlate: Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

- A. Contractor's Construction Schedule.
- B. Application for Payment Form.
- C. List of Subcontractors.
- D. List of Principal Suppliers and Fabricators.
- E. Schedule of Submittals.

Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than ten (10) working days before the date scheduled for submittal of the initial Application for Payment.

Form: The schedule of values will be submitted on AIA Document G702 Application and Certificate for Payment or other prior approved form.

Format and Content: Use the Project Manual Table of Contents as a guide to establish line items the format for the Schedule of Values.

- A. Identification: Include the following Project identification on the Schedule of Values:
 - 1. Project name and location.
 - 2. Name of the Architect.
 - 3. IFB number.
 - 4. Contractor's name and address.
 - 5. Date of submittal.

- B. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
- C. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
- D. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - 1. Temporary facilities and other major cost items that are not direct cost of actual work-in- place may be shown either as separate line items in the schedule of values or distributed as general overhead expenses, at contractor's option.
- E. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

APPLICATIONS FOR PAYMENT

See General Conditions of the Contract. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment, or similar approved document.

Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

- A. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
- B. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

Daily Logs: Provide complete and accurate Daily Logs with associated photographs to document work conditions with each Application for Payment.

Record Drawings: Review As-Built / Project Record Drawings. Reference Section 01 78 00 – Closeout Submittals on page 2, Project Record Documents paragraph for additional information.

Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.

- A. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the initial Application for Payment include the following:

- A. List of subcontractors
- B. Schedule of values
- C. Contractor's construction schedule (preliminary if not final)
- D. Schedule of unit prices
- E. Submittal schedule (preliminary if not final)
- F. List of Contractor's staff assignments
- G. List of Contractor's principal consultants
- H. Copies of building permits
- I. Copies of authorization and licenses from authorities having jurisdiction for performance of the Work
- J. Initial progress report
- K. Report of preconstruction conference
- L. Certificates of insurance and insurance policies.

Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

- A. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
- B. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

Administrative Actions: Administrative actions and submittals that shall proceed or coincide with this application include:

- A. Change-over information related to Owner's occupancy, use, operation and maintenance.
- B. Final cleaning.
- C. Advice on shifting insurance coverages.
- D. Final progress photographs.
- E. List of incomplete Work, recognized as exceptions to Owner's Representative Certificate of Substantial Completion.

Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

- A. Evidence of completion of Project closeout requirements.
- B. Completion of items specified for completion after Substantial Completion.
- C. Evidence that unsettled claims will be settled.
- D. Assurance that Work not complete and accepted will be completed without undue delay.
- E. Transmittal of required Project construction records to Owner.
- F. Disposal receipts, bills of lading and other required documentation of transportation and disposal of asbestos-containing waste if required.
- G. Insurance certificates for products and completed operations where required and proof that taxes, fees and similar obligations were paid.
- H. Removal of temporary facilities and services.
- I. Final meter readings for utilities, a measured record of stored fuel and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for

- corresponding elements of the Work Removal of surplus materials, rubbish and similar elements.
- J. Final liquidated damages settlement statement.

PART TWO – PRODUCTS - (Not Applicable)

PART THREE – EXECUTION - (Not Applicable).

* * * * *

END OF SECTION 01 29 00

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: This section includes quality assurance of administrative and supervisory personnel, submittals, administrative procedures, daily log, special reports, contingency plan, coordination drawings, general installation provisions, cleaning and protection required for the project.

RELATED WORK

General: Following items of related work are included in other sections:

- A. Project Meetings: Section 01 31 19
- B. Materials and Equipment: Section 01 61 00
- C. Field Engineering: Section 01 71 23
- D. Cutting and Patching: Section 01 73 29
- E. Cleaning and Waste Management: Section 01 74 00

QUALITY ASSURANCE OF ADMINISTRATIVE AND SUPERVISORY PERSONNEL

General Superintendent: Refer to the General Conditions A201-2017 paragraph 3.9.

- A. As per General Conditions A201-2017 paragraph 3.9.1, provide a full-time General Superintendent who is experienced in administration and supervision of projects of this scope including, but not limited to, work practices, protective measures for building and personnel and disposal procedures. This person is the Contractor's Representative responsible for compliance with all applicable federal, state and local regulations.

Experience and Training: The General Superintendent must have had a minimum of seven (7) years on-the-job training on construction projects. Provide resume of superintendent as indicated in the General Conditions A201-2017 paragraph 3.9.2. The superintendent is to remain on the project until completion of all punch list items unless procedures from General Conditions A201- 2017 paragraph 3.9.3 are followed.

SUBMITTALS

Before the Start of Work: Submit the following to the Architect for review. No work shall begin until these submittals are returned with the Architect's Shop Drawing stamp indicating that the submittal is returned approved or revise and re-submit.

Contingency Plans: for emergency actions.

Telephone Numbers: and location of emergency services.

Notifications: sent to other entities at the Work site.

Notifications: sent to emergency service agencies.

Resume: of general superintendent.

Staff Names: Within 15 days of Notice to Proceed, submit a list of Contractor's principal staff assignments, including Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities, list their addresses and telephone numbers.

Post copies of the list in the project meeting room, the temporary field office and each temporary telephone.

Subcontractor / Supplier Staff Names: Within 30 days of Notice to Proceed, submit a list of the Subcontractors and material suppliers including the project foreman and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

Post copies of the list in the project meeting room, the temporary field office and each temporary telephone.

Construction Schedule: Within 14 days after being awarded the Contract, the Contractor shall submit for the Owner's and Architect's information a construction schedule for the Work. An updated construction schedule shall be submitted with each Application for Certificate for Payment.

ADMINISTRATIVE PROCEDURES

General: Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports and attendance at meetings.

- A. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

Coordinate: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include, but are not limited to the following:

- A. Preparation of Schedules
- B. Installation and Removal of Temporary Facilities
- C. Delivery and Processing of Submittals
- D. Delivery of Material and Equipment
- E. Progress Meetings
- F. Project Closeout Activities

DAILY LOG

General: Maintain a Daily Log within the Contractors job shack documenting the dates and time of, but not limited to, the following items:

- A. Meetings; purpose, attendees, brief discussion
- B. Visitations; authorized and unauthorized
- C. Personnel; by name, entering and leaving the Work area
- D. Special or unusual events, accidents
- E. Upkeep of Record Drawings and Specifications
- F. Work Progress Schedule
- G. As it occurs, document inclement weather conditions and how they affect the Work.
Document from a local weather website low temperatures and how they affect the Work in

progress. Photograph the site after rain fall and document from the above mentioned website the daily amount of rain fall and how it affects the Work in progress.

- H. Note: Inclement weather documentation shall be required to be submitted with Change Order Request when requesting any additional construction days to be added to the contract.
- I. Make available a copy of this log to the Owner or Architect on a daily basis or as requested.
- J. Submit copies of this log at final closeout of project as a project close-out submittal.

SPECIAL REPORTS

General: Except as otherwise indicated, submit special reports directly to the Owner within one day of the occurrence requiring special report, with copy to the Architect and others affected by the occurrence.

Reporting Unusual Events: When an event of unusual and significant nature occurs at the site, prepare and submit a special report listing chain of events, persons participating and response by Contractor's personnel, evaluation of results or effects and similar pertinent information.

Reporting Accidents: Prepare and submit reports of significant accidents at the site and anywhere else Work is in progress. Record and document data and actions; comply with industry standards. Photograph accident as may be required for insurance purposes. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained or where the event posed a significant threat of loss or personal injury.

Report Discovered Conditions: When an unusual condition of the building is discovered during the work (e.g. leaks, termites, corrosion, asbestos) prepare and submit a special report indicating the condition discovered.

CONTINGENCY PLAN

Contingency Plan: Prepare a contingency plan for emergencies including fire, accident, power failure or any other event that may cause a threat to persons and property.

Post: in the job shack telephone numbers and locations of emergency services including, but not limited to, fire, ambulance, doctor, hospital, police, power company and telephone company.

QUALITY ASSURANCE

Control of Installation:

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship to product Work of specified quality.
- B. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.
- C. Perform work by persons trained and qualified to produce workmanship of specified quality.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

CONTRADICTION OR INCONSISTENCIES OF CONTRACT DOCUMENTS

General: If contradiction, inconsistencies, conflict, omission or lack of detailed description is discovered in the contract documents, the Contractor shall immediately notify the Architect and request clarification. Refer to Section 01 26 00 – “Contract Modification Procedures” for the process and procedures. The Architect will resolve the issue and make any corrections or interpretations necessary to fulfill the intent of the plans and specifications.

COORDINATION OF THE WORK WITH THE OWNER

General: Grambling State University buildings shall remain open and in operation during all construction. Contractor shall coordinate construction activities with Grambling State University.

COORDINATION OF THE WORK

General: Contractor shall coordinate construction activities included in various Sections of these Specifications to assure efficient and orderly installation of each component. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection and operation.

- A. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.
- B. Coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.
- C. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to and placing in service such equipment.
- D. 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.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner’s partial occupancy.
- G. 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.
- H. Make provisions to accommodate items scheduled for later installation.

COORDINATION DRAWINGS

General: Prepare Coordination Drawings where close coordination is required for installation of products and materials fabricated off-site by separate entities and where limited space necessitates maximum utilization of space for efficient installation of different components.

- A. Show relationship of components shown on separate Shop drawings.
- B. Indicate required installation sequences.
- C. Refer to Division 22 Section “Plumbing General Conditions”, Division 23 Section “HVAC General Conditions” and Division 26 Section “Common Work Results for Electrical Power Systems” for requirements for plumbing, mechanical and electrical installations.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION

INSPECTION OF CONDITIONS

General: The installer of each component shall inspect the substrate and conditions under which work is performed. Do not proceed until unsatisfactory conditions have been corrected.

Verification of Conditions:

- A. Verify that existing conditions, surfaces and substrates are acceptable for subsequent Work.
- B. Verify that field measurements are as required to receive subsequent Work.
- C. Verify that existing substrate is capable of structural attachment of the new Work being applied or attached.
- D. Examine and verify specific conditions described in individual specifications sections.
- E. Verify that utility services are available, of the correct characteristics and in the correct location.

Report: Report in writing to the Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.

Beginning the Work: By beginning the Work, the Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

PREPARATION

- A. Clean substrate surfaces prior to applying the next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply any manufacturer required or recommended substrate primer, sealer or conditioner prior to applying any new material or substance in contact or bond.

GENERAL

- A. Recheck measurements and dimensions before starting each installation.
- B. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

MANUFACTURER'S INSTRUCTIONS

- A. Comply with the manufacturer's installation instructions, including each step in sequence and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- C. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Allow for expansion and building movement.

TOLERANCES

- A. Monitor tolerance control of installed products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from the Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

VISUAL EFFECTS

- A. Provide uniform joint widths in exposed Work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

ENCLOSURE OF THE WORK

- A. Coordinate temporary enclosures with required inspections and test to minimize the necessity of uncovering completed construction for that purpose.

MOUNTING HEIGHTS

- A. Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Owner's Representative for final decision.

CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise operations to ensure that no part of construction, completed or in progress is subject to harmful or deleterious exposure. Such exposures include, but are not necessarily limited to the following:
 - 1. Excessive weathering
 - 2. Excessively high or low temperatures or humidity
 - 3. Water or ice
 - 4. Chemicals or solvents
 - 5. Heavy traffic, soiling, staining and corrosion
 - 6. Contact between incompatible materials
 - 7. Theft or vandalism
 - 8. Excessive static or dynamic loading
 - 9. Thermal shock
 - 10. Combustion

* * * * *

End of Section 01 31 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: To enable orderly review during progress of Work, and to provide for systematic discussion of problems, Architect will conduct Project Meetings throughout construction period unless otherwise noted.

RELATED WORK

General: Contractor's relations with his subcontractors and material suppliers, and discussions relative thereto, are Contractor's responsibility and are not part of Project Meetings' content.

QUALITY ASSURANCE

General: Persons designated by Contractor to attend and participate in Project Meetings shall have all required authority to commit Contractor to solutions agreed upon in Project Meetings.

SUBMITTALS

Agenda Items: To maximum extent practicable, advise Architect at least 24 hours in advance of Project Meetings regarding all items to be added to agenda.

Minutes: Contractor shall compile minutes of each Project Meeting.

- A. Contractor shall record meeting minutes, develop and maintain RFI, ASI, and RFP logs.
- B. Email meeting minutes within one day after meeting to all participants including Architect, Owner, participants and those affected by decisions made.

Sign-in Sheet: Pass around a sign-in sheet at all meetings for all attendees to sign and fill out contact information. Use attached sign-in sheet at the end of this Section as a "go-by".

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PART TWO - PRODUCTS - (Not Applicable)**PART THREE - EXECUTION****MEETING SCHEDULE**

General: Except as noted below for Pre-Construction Meeting, Project Meetings will be held once a month. Coordinate as necessary to establish mutually acceptable schedule for meetings. Architect may call for a Project Meeting at Owner's request.

MEETING LOCATION

TLJR
25035

General: To maximum extent practicable, meetings will be held at Project site.

PRE-CONSTRUCTION – PRE-DEMOLITION MEETING

General: Pre-construction – Pre-demolition Meeting will be scheduled within ten days after Owner has issued Notice to Proceed. Provide attendance by authorized representative of Contractor and all major subcontractors. Architect will advise Owner and other interested parties and request their attendance. This is an organizational meeting, to review responsibilities and personnel assignments of all parties involved in the work. All parties shall have reviewed the requirements of the Work and be prepared to bring up any and all items that may result in construction problems or Change Orders.

Minimum Agenda: Distribute data on and discuss:

- A. Execution of Owner-Contractor Agreement.
- B. Submission of executed bonds and insurance certificates.
- C. Distribution of Contract Documents, including distribution of required copies of original Documents and Revisions.
- D. Submission of lists of Subcontractors, Products, Schedule of Values and Progress Schedule.
- E. Designation of personnel representing the parties in Contract.
- F. Channels and procedures for communications.
- G. Discussion of construction schedule, including sequence of critical work.
- H. Processing of Shop Drawings and other data submitted to Architect for review.
- I. Procedures and procession of field decisions, submittals, substitutions, Applications for Payments, proposal request, Change Orders and Contract closeout procedures.
- J. Rules and regulations governing performance of Work.
- K. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.
- L. Submittal Schedule

PROJECT PROGRESS MEETINGS

Attendance: The General Contractor shall maintain same team by RFQ from Completion of the Project. Assign same person or persons to represent Contractor at Project Meetings throughout progress of Work. Subcontractors, material suppliers, and others may be invited to attend those project meetings in which their aspects of Work are involved.

Minimum Agenda:

- A. Review, revise as necessary, and approve minutes of previous meeting.
- B. Review progress of Work since last meeting, including status of submittals for approval.
- C. Field observations, problems and decisions.
- D. Identify problems which impede planned progress.
- E. Develop corrective measures and procedures to regain planned schedule.
- F. Complete other current business including review of Contractor's current Request for Payment.
- G. Review all logs including but not limited to the RFI Log, ASI Log and status of any outstanding items. Submit log and Change Request Log which should be provided by the General Contractor.
- H. Review of off-site fabrication and delivery schedules.

- I. Review and maintain Project Schedule.
- J. Discuss as needed any corrective measures to regain projected schedules.
- K. Discuss the effect of proposed changes on progress schedule and coordination.

GENERAL PRE-INSTALLATION MEETING

General: When required in individual specification sections, convene a pre-installation meeting at work site prior to commencing work of the section.

Attendance: All parties directly affecting or affected by, work of the specific section.

Notification: Notify Architect one week in advance of meeting date.

Agenda: Contractor and subcontractor to jointly prepare appropriate agenda and preside over meeting.

- A. Review conditions of installation, preparation and installation procedures.
- B. Review coordination with related work.

MASONRY PRE-INSTALLATION MEETING

Attendance: Contractor, masonry subcontractor, masonry materials supplier and others whose aspects of Work are involved, may be invited to attend Masonry Pre-Installation Meeting.

Minimum Agenda:

- A. Review all aspects of installation of masonry.
- B. Review sample panel and an application demonstration by personnel assigned to this Project.
- C. Review progress of work in place prior to application of masonry.
- D. Identify problem areas which might impede or affect application of masonry.
- E. Develop required corrective measure for identified problem areas.

HARDWARE KEYING PRE-INSTALLATION MEETING

Attendance: Contractor, hardware supplier, owner and others whose aspects of Work are involved, may be invited to attend Hardware Keying Pre-Installation Meeting.

Minimum Agenda:

- A. Review all aspects of keying requirements of the owner.
- B. Review hardware shop drawings.
- C. Review and coordinate all card reader locations.

PRE-CLOSEOUT CONFERENCE

Purpose: To review final inspections and closeout document submittal requirements.

Timing: Notify the local Fire Marshal's Office of the date and time of the Punch List Inspection. This must be done at least seven (7) days prior to the scheduled date. To issue an occupancy permit the Fire Marshal will require several certifications, including the following:

- A. Designer submitted Certificate of Completion (Fire Marshal form).

- B. Sprinkler certification.
- C. Fire Alarm certification.
- D. Fire Extinguishers inspected and tagged by licensed contractor (unless invoice shows they are less than one year old).
- E. All hot water heaters of 50 or more gallon capacity must be inspected (usually handled by the User).

Attendance: User, Contractor, Architect, Engineers and Subcontractors.

Minimum Agenda: Review the following items that need to be submitted with the Closeout Submittals and final procedures:

- A. All equipment should be operating and instructions on usage given immediately to the User Agency.
- B. Note that the 5 or 10 % retainage is only for liens. A separate amount must be withheld for Punch List work. If the value of the Punch List equals more than the funds remaining in the project, Acceptance must be delayed until the punch list value is reduced to the amount of remaining funds. The Designer shall provide the values for each item on the punch list.
- C. On deeming the project to be “substantially complete”, the designer will complete and submit to GSU, the Recommendation of Acceptance. GSU will send the “NOTICE OF ACCEPTANCE OF BUILDING CONTRACT” to the contractor. This is the form to be filed in the courthouse. The 45-day lien period will not start until this document is filed. See Item (D).
- D. The User Agency should provide a letter of concurrence prior to Acceptance.
- E. The Owner shall not approve payment of the 5 or 10% retainage without the following:
 - 1. An invoice approved by the designer,
 - 2. A Consent of Surety to Final Payment (AIA Form G707),
 - 3. A Clear Lien Certificate showing that 45-days have elapsed since the Notice of Acceptance was filed with the Clerk of Court. Note that in obtaining the clear lien certificate, the contractor should ensure that the full 45 days have passed and that the 45th day is not a legal holiday as legal holidays can extend the lien period. Clear Lien Certificates obtained on the 45th day are not acceptable.
- F. The Owner requires certification by the designer that the punch listed work has been completed prior to any payment of money withheld for the Punch List. If the Punch List is not completed within 45 days after Acceptance, the contractor may be placed in default. Contractor must be paid for all punch list work completed by the end of the 45 day lien period at the end of the 45 day lien period.
- G. The Designer shall bring to the attention of the Contractor all deficiencies as soon as they are discovered and shall NOT wait until the punch list is prepared.

* * * * *

End of Section 01 31 19

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Submit Shop Drawings, Product Data and Samples as required by Contract Documents in accordance with requirements specified herein.

RELATED REQUIREMENTS

General: Following Related Requirements are included as specified in other sections.

- A. Definitions, and Additional responsibilities of Parties to Contract: General and Supplementary Conditions of the Contract.
- B. Record Documents: Section 01 78 00

Schedule: Designate in construction schedule, or in a separate coordination schedule, dates for submission and dates reviewed Shop Drawings, Mockups Product Data and Samples will be needed.

SHOP DRAWINGS

General: Where Shop Drawings are required for submittal under individual sections, drawings shall be submitted and presented in clear and thorough manner as follows:

- A. **Drawings:** Provide Shop Drawings identified by reference to appropriate Specification Section with all information required in accordance with submittal requirements found under individual sections of Project Manual Specifications.
- B. **Details:** Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
- C. **Required Number:** Unless shop drawings are on larger than 11' x 17" paper, it is preferable for them to be submitted electronically, via email otherwise, submit one (1) set in reproducible form (PDF Format) on CD and two (2) bond sets of prints.
 - 1. Submit prints to Architect rolled in tube; do not fold. Send CD's in proper mailing package to prevent damage.

Corrections: Architect will mark corrections, comments and return required number of prints of marked up sets.

Resubmittals: If directed, submit one (1) set of corrected Shop Drawings in reproducible form PDF Format on CD.

PRODUCT DATA

General: Where Product Data, brochures, descriptive literature, color charts, etc. are required for submittal under individual sections, submit as follows:

- A. **Preparation:**
 - 1. Clearly mark each copy to identify Specification Section and pertinent products or models.
 - 2. Show performance characteristics and capacities.
 - 3. Show dimensions and clearances required.
 - 4. Show wiring or piping diagrams and controls.
- B. **Required Number:** Submit six (6) copies.

Notice: Fax submittals of product data will not be allowed unless Architects allows in special circumstances.

SAMPLES

General: Where samples are required for submittal under individual sections, submit as follows:

- A. **Office Samples:** Samples shall be of sufficient size and quantity to clearly illustrate.
 - 1. Functional characteristics of product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.
 - 3. Provide required number as specified in respective Section.
- B. **Field Samples:**
 - 1. Contractor shall erect, at Project site, at a location acceptable to Architect.
 - 2. Size or area; that specified in respective sections.
 - 3. Fabricate each sample and mock-up complete and finished as specified in respective sections.
 - 4. Remove mock-ups at conclusion of Work or when acceptable to Architect as specified in respective section.

CONTRACTOR RESPONSIBILITIES

General: Contractor's responsibilities for submittals shall be as follows:

- A. **Review:** Contractor to review Shop Drawings, Product Data and Samples prior to submission to Architect.
- B. **Determine and Verify:**
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with Project Specifications.
 - 5. Quantities. Architect WILL NOT verify quantities.
- C. **Note:** Begin no fabrication or work which requires submittals until return of submittals with Architect's approval, unless such approval is waived in writing by Architect.

SUBMISSION REQUIREMENTS

General: Make Submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in Work.

Submittal Contents: Submittals shall include a cover sheet or title page which shall show following information:

- A. Date of submission and dates of any previous submissions.
- B. Project Title and Architect's Commission number.
- C. Names of:
 - 1. Contractor
 - 2. Supplier
 - 3. Manufacturer
- D. Identification of product by Project Manual Specification section number.
- E. Field dimensions, clearly identified as such.
- F. Applicable standards, such as A.S.T.M.
- G. Identification of deviations from Contract Documents.
- H. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of information within submittal with requirements. Submittals which have not been stamped and certified by the Contractor will be returned without further review, at Contractor's expense.
- I. Quantities.

RESUBMISSION REQUIREMENTS

General: Make any corrections or changes in submittals required by Architect and resubmit until approved. Resubmission requirements are same as noted above for submissions with following addition requirements:

- A. Shop Drawings and Product Data:
 - 1. Revise initial changes or data, and resubmit.
 - 2. Indicate any revisions on resubmittals.
 - 3. Indicate any changes which have been made other than those requested by Architect.
- B. Samples: Submit new samples as required for initial submittal.

DISTRIBUTION

Shop Drawings and Product Data: Distribute reproductions of Shop Drawings and copies of Product Data which carry Architect's stamp of approval to:

- A. Job site file.
- B. Record Documents file.
- C. Subcontractors.
- D. Supplier or Fabricator.
- E. Other affected contractors or subcontractors.

Samples: Distribute approved samples as directed by Architect.

ARCHITECT DUTIES

General: Architect to review submittals with 10 Working Days and in accord with schedule. Architect to approval stamp and initial or signature, and indicate approval of submittal or requirements for resubmittal. Architect to return to Contractor for distribution, or for resubmission.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

* * * * *

End of Section 01 33 23

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

SUMMARY**Section Includes:**

Procedural Requirements
Rehabilitation and Renovations of Existing Buildings and Related Materials Installation
of Products Removed During Demolition Phase.

Related Sections:

- A. Section 01 73 29 - Cutting and Patching
- B. Section 01 74 00 - Cleaning & Waste Management
- C. Division 21-49 Sections

PART TWO – PRODUCTS**PRODUCTS FOR PATCHING AND EXTENDING WORK**

- A. New Materials: As specified in individual Sections.
- B. Match existing products and work for patching and extending work.
- C. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make work complete and consistent with Specifications.

PART THREE – EXECUTION**INSPECTION**

- A. Verify that substrate restoration is complete and areas are ready for installation of new work.
- B. Beginning of restoration work means acceptance of existing conditions.

PREPARATION

- A. Cut, move, or remove items as necessary for access to alterations and renovations work; replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, rusted metals, and deteriorated masonry and concrete; replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surfaces and remove surface finishes to provide for proper installation of new work and

- new finishes. Clean substrate surfaces prior to applying next material or substance.
- E. Seal cracks or openings of substrate prior to applying next material or substance.
 - F. Apply any manufacturer's required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion.
- B. Remove, cut, and patch work in a manner to minimize damage and to provide means of restoring products and finishes to specified condition.
- C. Refinish visible existing substrate surfaces to existing substrates to specified condition for each material with a neat transition to adjacent new finishes.
- D. Install products as specified in individual Sections.

TRANSITIONS

- A. Where new work abuts or aligns with existing, make a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division as approved by Architect or Owner's Representative.

ADJUSTMENTS

- A. Where removal results in adjacent surfaces forming a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Architect's review.

REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces to remain which are damaged, lifted, discolored, or showing other imperfections where visually evident on exterior wall or roof surfaces.
- B. Repair substrate prior to patching finish.

FINISHES

- A. Finish surfaces as specified in individual Sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

* * * * *

End of Section 01 35 16

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

DEFINITIONS

General Explanation: A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including Drawings, which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for Work to extent not stated more explicitly in another provision of Contract Documents.

- A. **General Requirements:** Provisions or requirements of DIVISION 1 Sections. General Requirements apply to entire work of Contract and, where so indicated, to other elements which are included in Project.
- B. **Indicated:** Term "indicated" is a cross-reference to details, notes or schedules on Drawings, to other paragraphs or schedules in specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- C. **Directed, Requested, etc.:** Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "directed by Architect", "requested by Architect", etc. However, no such implied meaning will be interpreted to extend Architect's responsibility into Contractor's area of construction supervision.
- D. **Approve:** Where used in conjunction with Architect's response to submittals, requests, applications, inquiries, reports and claims by Contractor, meaning of term "approved" will be held to limitations of Architect's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.
- E. **Furnish:** Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- F. **Install:** Except as otherwise defined in greater detail, term "install" is used to describe operations at Project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- G. **Provide:** Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
- H. **Installer:** Entity (person or firm) engaged by Contractor or its subcontractor or sub-subcontractor for performance of a particular unit of work at Project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

- I. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of Work, either at Project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

INDUSTRY STANDARDS

General Applicability of Standards: Applicable standards of construction industry have same force and effect (and are made a part of Contract Documents by reference) as if copied directly into Contract Documents, or as if published copies were bound herewith.

- A. Referenced standards (referenced directly in Contract Documents or by governing regulations) have precedence over non-referenced standards, which are recognized in industry for applicability to work.

Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.

Copies of Standards: Provide where needed for proper performance of the work; obtain directly from publication sources.

Abbreviations and Names: Where acronyms or abbreviations are used in specifications or other Contract Documents they are defined to mean industry recognized name of trade association, standards generating organization, governing authority or other entity applicable to context of text provision. Refer to "Encyclopedia of Associations", published by Gale Research Co., available in large libraries.

GOVERNING REGULATIONS/AUTHORITIES

General: Procedure followed by Architect has been to contact governing authorities where necessary to obtain information needed for purpose of preparing Contract Documents recognizing that such information may or may not be of significance in relation to Contractor's responsibilities directly for necessary information and decisions having a bearing on performance of Work. Contractor shall contact governing authorities directly for necessary information and decisions having a bearing on performance of work of this Project.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - Shop Drawings, Product Data and Samples

Permits, Licenses and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of Work.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

* * * * *

End of Section 01 42 15

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide Temporary Facilities and Controls required for this Project including, but not limited to:

- A. Temporary utilities such as power for heat and A/C, water, electricity and telephone.
- B. Field offices and sheds.
- C. Sanitary facilities.
- D. Enclosures such as tarpaulins, barricades, and canopies.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections.

- A. Additional requirements of Contractor for Temporary Facilities and Controls: General and Supplementary Conditions of the Contract.
- B. Use of Project site: Section 01 11 00.
- C. Protection of Project reference points: Section 01 71 23.11.
- D. Permanent installation and hook-up of various utility lines are described in pertinent sections of Divisions 21, 22, 26, 27, 28, 33.

Note: Except that all equipment furnished by subcontractors shall comply with all requirements of pertinent safety regulations; ladders, planks, hoists, and other similar items of construction equipment normally furnished by individual trades in execution of their own portions of Work are not part of this Section.

INFORMATIONAL SUBMITTALS

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

Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit, LDEQ or authorities having jurisdiction, whichever is more stringent.

Fire-Safety Program: Show compliance with requirements of NFPA 241 Standard for Safeguarding Construction, Alteration and Demolition Operations and authorities having jurisdiction. Indicate the Contractor's personnel responsible for management of fire prevention program.

MAINTENANCE OF FACILITIES

General: Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of Work.

REMOVAL AND PROTECTION OF EXISTING UTILITIES

Contractor: Notify all corporations, companies, individuals or local authorities owning, or having jurisdiction over conduits, wires, pipes, or other equipment that are not needed or that interfere in any manner with execution of Work under this Contract; remove or protect such utilities or equipment as required by parties having jurisdiction over same.

PART TWO - PRODUCTS

TEMPORARY UTILITIES

General: All temporary utilities shall be subject to approval by Architect.

Temporary Water: Provide temporary water service required for performance of Work as follows:

- A. **General:** Extend water service to suitable location on Project site.
- B. **Bill Payment:** The Contractor is not responsible for paying the water bills or meter deposit.
- C. **Project Closeout:** Upon completion of Work, remove all such temporary facilities.

Temporary Electricity: Provide temporary electrical service required for performance of the Work as follows:

- A. **General:** Extend electrical service to suitable location on Project site.
- B. **Note:** Refer to section in Division 26 - "Electrical" in Project specifications for extent of electrical service required to be provided for the Project. Any additional electrical power or outlets required for proper execution and completion of the Work under such heading or section, or by Contractor if such Work is not under subcontract.
- C. **Bill Payment:** For a new project, all electricity bills, including meter deposit to be paid by Contractor.
- D. **Project Closeout:** Upon completion of Work, remove all such temporary facilities.
- E. **Transfer of Temporary Power:** Transfer of temporary power to permanent power shall be executed one week prior to the opening date unless otherwise required by the Owner.

Utilities for Testing: Normal quantities of utilities required to make preliminary or final test of installed permanent system shall be furnished by Contractor.

FIELD OFFICES AND FACILITIES

General: All temporary field offices and facilities shall be subject to approval by Architect.

Field Offices: The Contractor shall provide and maintain on the site a securable / lockable field office building or trailer of adequate size and accommodations for all of the Contractor's offices on foundations adequate for normal loading and for holding Project Meetings as follows:

- A. **General:** Field office to be equipped with telephone and HVAC equipment; furnished with plan desk, all required tables, chairs and utilities. Provide the superintendent with a cellular telephone for use at and when away from the field office.
- B. **Fire Extinguishers:** Portable, UL rated; with class and extinguishing agent as required by locations

and classes of fire exposures..

- C. Files: Keep in field office at all times complete sets of Drawings, Project Manuals, Architect reviewed Shop Drawings and Submittals, Bulletins, Addendums, Change Orders and other pertinent records.
- D. Project Closeout: Field office, including furniture, will remain property of Contractor and shall be removed from Project site after completion of Work.

Temporary Toilets: Provide and maintain temporary toilets as necessary for all construction personnel. Keep toilets in sanitary condition. Locate temporary toilets as directed, relocate inside building or connect to sewer as soon as progress of Work will allow. Remove from Project site when Work is completed; leave premises clean.

Temporary Storage: Provide securable / lockable temporary sheds or trailers adequate in size for all materials and supplies that require protected storage as required for performance of the Work. Remove from Project site upon completion of Work.

ENCLOSURES

General: Furnish, install, and maintain for duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of Work in compliance with all safety and other regulations.

SECURITY AND PROTECTION FACILITIES INSTALLATION

Acceptable Manufacturers: National Construction Rentals or United Site Services.

Temporary Project Site Enclosure Fence: Provide temporary fence panels and gates to secure and enclose the entire job site and staging area as indicated on drawings. Provide 8 feet high free-standing chain link fence panels constructed with top, intermediate and bottom horizontal and vertical galvanized bars with 2-inch galvanized, 9 gauge mesh fence fabric, supported by panel stands (feet) painted in high visibility safety orange paint and made of metal. Vertical post can be in-ground / "pounded post" in other than paved areas.

Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities and other improvements at the Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

Environmental Protection: Provide protection, operate temporary facilities and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway and subsoil contamination or pollution or other undesirable effects.

Temporary Erosion and Sedimentation Control: Comply with the requirements of the most current EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 31 20 00 "Earth Moving".

Storm-water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm-water from heavy rains.

Tree and Plant Protection: The Contractor will be responsible for any and all damage to any trees to remain on the site. If a tree is damaged, the Contractor shall prepare a written report to be delivered to the Architect. This report will describe the type, size and location of the tree and the amount of damage. All damage shall

be repaired as soon as possible by an expert in plant care. The Contractor will assume all cost for the protection of major trees near the construction site. The Contractor will construct wood barricades around the trees.

PROJECT SIGNS

General: Allow no signs or advertising of any kind on Project site except as specifically approved in advance by Architect.

PART THREE - EXECUTION

MAINTENANCE AND REMOVAL

General: Maintain all Temporary Facilities and Controls as long as needed for safe and proper completion of Work. Remove all such Temporary Facilities and Controls as rapidly as progress of Work will permit, or as directed by Architect.

* * * * *

End of Section 01 50 00

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide materials and equipment that are indicated and/or specified to be incorporated into Work as follows:

- A. Conform to applicable specifications and standards.
- B. Comply with size, make, type, and quality indicated and/or specified or as specifically approved in writing by Architect.
- C. Manufactured and Fabricated Products:
 - 1. Design, fabricate and assemble in accordance with best engineering and shop practices.
 - 2. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - 3. Two or more items of same kind shall be identical and by same manufacturer.
 - 4. Products shall be suitable for service conditions.
 - 5. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved by Architect in writing.
- D. Do not use materials or equipment for any purpose other than that for which it is designed or is specified.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Responsibilities of all Parties to the Contract: General and Supplementary Conditions of the Contract
- B. Summary of Work: Section 01 11 00
- C. Submittals and Shop Drawings: Section 01 33 23
- D. Substitutions and Product Options: Section 01 62 00
- E. Operating & Maintenance Data: Section 01 78 00
- F. Cleaning: Section 01 74 00

MANUFACTURER'S INSTRUCTIONS

General: When Contract Documents require that installation of various products used in Project be installed in compliance with manufacturer's printed instructions, Contractor shall execute that portion of the Work as follows:

- A. **Distribution:** Obtain and distribute copies of such instructions to parties involved in each products installation including two (2) copies to Architect. Maintain one set of complete instructions at jobsite during installation. Include one complete set of instructions with Project Record Documents.

- B. Execution: Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformance with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect for further instructions.
 - 2. Do not proceed with Work without clear instructions.
 - 3. Perform Work in accordance with manufacturers' instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.
- C. Inspection: Manufacturer's printed installation instructions which, when specified and approved by Architect, shall become basis for inspecting and accepting or rejecting actual installation methods used on Work.

TRANSPORTATION AND HANDLING

General: Arrange deliveries of products in accordance with construction schedules; coordinate with Work and condition at Project site as follows:

- A. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
- B. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and that they are undamaged.
- C. Provide equipment and personnel to handle product by methods to prevent soiling or damage to products or packaging.

STORAGE AND PROTECTION

Storage: Store products in accordance with manufacturer's instructions, with seals and labels intact and legible, as indicated in various other sections and as follows:

- A. Storage: Store products subject to damage by elements in weathertight enclosures.
- B. Temperature: Maintain temperature and humidity within ranges covered by manufacturer's instructions.
- C. Exterior Storage: Provide exterior storage as follows:
 - 1. Store fabricated products above ground, on blocking or skids prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.
- D. Inspection: Arrange storage in manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and that products are free from damage or deterioration.

Protection after Installation: Provide substantial covering as necessary to protect installed products from damage from traffic and/or subsequent construction operations. Remove when no longer needed.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

* * * * *

End of Section 01 61 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Responsibilities of all Parties of Contract: General and Supplementary Conditions of the Contract
- B. Submittals and Shop Drawings: Section 01 33 23

SUBSTITUTIONS AND PRODUCT OPTIONS

Product List: Within 30 days after Contract Date, submit to Architect a complete list of major products proposed to be used, with name of manufacturer and installing subcontractor.

Contractor's Options:

- A. For products or methods specified only by commercial standard, reference standard, Federal Specification, trade association standards or other similar standards; select any product or method meeting that standard. Where this Specification requires a better quality than such standard, these Project Specifications shall govern.
- B. For products specified by naming several products or manufacturers, select any one of products or manufacturers named, which complies with this Project Specification.
- C. For products specified by naming one or more products, methods or manufacturers and "or equal", Contractor must submit a request as for substitutions for any product or method or manufacturer not specifically named during the bid period.

Note: Where proprietary products or methods are specified for one use, the intention is to establish a standard of quality, performance and/or size and not to exclude any other products of equal merit unless stated otherwise.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) days prior to the Bid Opening Date, no exceptions are allowed.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62

00 - "Substitutions and Product Options". **Note:** Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

Standard of Quality: The Contract Drawings and Specifications establish the "minimum standard of quality" each product and / or system must meet to be considered acceptable. Products of other manufacturers will be considered if the product and / or system meets or exceeds the "minimum standard of quality" established by the Contract Documents.

Submittals: Submit a separate request for each Product, supported with complete data, with drawings, cut sheets and samples as appropriate, including:

- A. Comparison of qualities of proposed substitution with that of specified product.
- B. Provide a written line-by-line, item-by-item description and comparison between the specified Product and the requested substitution product.
- C. Changes required in other elements of the Work because of substitution.
- D. Effect on construction schedule.
- E. Cost data comparing proposed substitution with product specified.
- F. Availability of maintenance service and source of replacement parts.
- G. It will be the responsibility of the submitting Contractor to prove equality.
- H. Request must include "Contractor's Substitution Request" Form, a copy of which is attached to this Section.

Contractor's Representation: Contractor's substitution of a product constitutes a representation that Contractor:

- A. Has investigated proposed product and determined that it is equal or superior in all respects to that specified.
- B. Will provide same warranties or bonds for substitution as for product specified.
- C. Will coordinate installation of an accepted substitution into Work and make such other changes as may be required to make Work complete in all respects.
- D. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

"Or Approved Equal": Where the phrase "or approved equal" occurs in the Contract Documents, do not assume that material, equipment or methods will be approved as equal by the Architect unless the item has been specifically approved for this Work by the Architect.

- A. Color choices will be one of the determining factors for approval.
- B. The decision of the Architect will be final.

Availability of Specified Items:

- A. Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.
- B. In the event specified item or items will not be so available, notify the Architect prior to the receipt of Bids.
- C. Cost of delay caused on non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the Owner.
- D. Whenever the Contractor secures approval for changing any items and such change involved a corresponding change or adjustment in any adjacent or related item, the responsibility for making the required change, or seeing that it is made, rest with the Contractor unless it is otherwise

agreed in writing, at the time the change is approved. The acceptance of any change will not, in any way, relieve the Contractor from full compliance with the Contract Documents.

Approval: Architect shall be judge of acceptability of proposed substitutions. Architect will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of decision to accept or reject requested substitution.

Notice: Architect's approval of an item for a previous project does not constitute approval for this Project.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION - (Not Applicable)

* * * * *

End of Section 01 62 00

**CONTRACTOR'S SUBSTITUTION
REQUEST FORM**

Project _____ :	Substitution Request Number: _____
_____	From: _____
To: _____	Date: _____
_____	A/E Project Number: _____
RE: _____	Contractor: _____

Specification Title: _____	Description: _____
Section: _____ Page: _____	Article / Paragraph: _____
Drawing Number(s): _____	Detail Number(s): _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
2. Same warranty will be furnished for proposed substitution as for specified product.
3. Same maintenance service and source of replacement parts, as applicable is available.
4. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
5. Proposed substitution does not affect dimensions and functional clearances.
6. Payment will be made for changes to building design, including A/E design, detailing and construction costs caused by the substitution.

The undersigned further states that the function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

A/E's REVIEW AND ACTION

- ☐ Substitution approved – Make submittals in accordance with Specification Section 01 33 23 – Shop Drawings, Product Data and Samples.
- ☐ Substitution approved as notes – Make submittals in accordance with Specification Section 01 33 23 – Shop Drawings, Product Data and Samples.
- ☐ Substitution rejected – Use specified materials.
- ☐ Substitution Request received too late – Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Comply with Project Closeout Requirements stated herein and in General Conditions of Contract for administrative procedures in closing out Work of Project.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Responsibilities of all Parties to Contract: Section 00 06 00 and Section 00 07 00
- B. Partial Owner Occupancy: Section 01 11 00
- C. Cleaning: Section 01 74 10
- D. Warranties: Section 01 78 00
- E. Closeout submittals required of Trades: Respective sections of Project Manual Specifications.
- F. Closeout Submittals: Section 01 78 00 **PART**

TWO - PRODUCTS - (Not Applicable) PART THREE –**EXECUTION****PROTECTION OF INSTALLED WORK**

General: Protect installed work from damage by construction operations specifically, but not limited to the following ways:

- A. 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. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

SYSTEM AND EQUIPMENT START-UP

General: The start-up of systems and equipment shall include, but not limited to the following:

- A. Coordinate a schedule for start-up of various equipment and systems.
- B. Notify the Architect and Owner seven 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 and for conditions that may cause damage.
- D. Verify 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 applicable Contractor personnel and 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 stating that equipment or system has been properly installed and is functioning correctly.

DEMONSTRATION AND INSTRUCTION

General: Arrange for each Installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures.

- A. Demonstrate operation and maintenance of products to Owner's personnel at time of Substantial Completion or prior to date of final inspection
- B. Demonstrate start-up, operation, control and control sequences, hazards, cleaning, noise and vibration adjustment, servicing, maintenance, safety procedures, economy and efficiency adjustments, effective energy utilization trouble-shooting, emergency operations and shut-down of each item of equipment at agreed time and at designated location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Review maintenance agreements and similar continuing commitments.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with the Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. ADJUSTING

General: Adjust operating products and equipment to ensure smooth and unhindered operation.

FINAL CLEANING

General: Execute final cleaning after Substantial Completion but before making final application for payment.

- A. Follow guidelines for final cleaning as specified in Section 01 74 00 "Cleaning and Waste Management".
- B. Clean areas to be occupied by the Owner prior to final completion before Owner occupancy.

CLOSEOUT PROCEDURES

General: When Contractor considers the Work is substantially complete, he shall submit written certification that:

- A. Contract Documents have been reviewed.
- B. Work has been inspected for compliance with Contract Documents.
- C. Work has been completed in accordance with Contract Documents.
- D. Equipment and systems have been tested in presence of Owner's representative and are operational.
- E. Work or designated portion thereof, is substantially complete and ready for final inspection
- F. The Contractor shall prepare, submit and complete a punch list in accordance with General Conditions.

Inspection: Within a reasonable time after receipt of such notice, Architect will make an inspection to determine status of completion.

Re-inspection: Should Architect determine that Work is not substantially complete:

- A. Architect will promptly notify Contractor in writing, giving reasons therefor.
- B. Contractor shall remedy deficiencies in Work and send a second written notice of substantial completion to Architect.
- C. Architect will re-inspect Work.
- D. If the Work is still not acceptable, the Designer and each of the Designer's principal consultants shall be paid for their time at the project site, for each additional punch list review at the rate of \$150.00 per hour. This is to be withheld by the Owner from the unpaid funds remaining in the Construction Contract sum.

Final Application for Payment: Contractor shall submit Final Application for Payment in accordance with procedures and requirements stated in Conditions of Contract.

Form: Statement shall reflect all adjustments to the Contract sum:

- A. The original Contract Sum.
- B. Additions and deductions resulting from:
 - 1. Previous Change Orders.
 - 2. Unit Prices.
 - 3. Deductions for uncorrected Work.
 - 4. Other adjustments.
- C. Total Contract Sum, as adjusted.
- D. Previous payments.
- E. Sum remaining due.

Final Adjustment: Architect will prepare a final Change Order, reflecting approved adjustments to Contract Sum which were not previously made by Change Orders.

Application for Final Payment:

- A. Prior to claim for Final Application for Payment, the Contractor shall submit closeout submittals as specified in Section 01 78 00 "Closeout Submittals".
- B. In application for Payment that coincides with, or first follows, the date of Substantial Completion is

claimed, show 100 percent completion for portion of the Work claimed as substantially complete. The five or ten percent retainage is only for liens.

- C. If 100 percent completion cannot be shown, a separate amount shall be withheld for the value of Punch List work. If the value of the Punch List equals more than the funds remaining in the project, Acceptance must be delayed until the punch list value is reduced to the amount of remaining funds. The designer shall provide values for each item on the Punch List.

Closeout Paperwork:

- A. When project is deemed “substantially complete”, the Designer is to prepare and submit to the Owner, a Recommendation of Acceptance accompanied by the Punch List of items to be completed or corrected, as verified and amended by the Architect. The outstanding items must have a value less than the amount of final payment remaining excluding the retainage before project can be accepted.
- B. The Manufacturer’s Roofing Warranty and the Contractor’s Roofing Warranty must be submitted prior to the building acceptance.
- C. The User Agency should provide a letter of concurrence prior to Acceptance.
- D. The Owner will send the “NOTICE OF ACCEPTANCE OF BUILDING CONTRACT” to the contractor.
- E. The contractor is to file the “NOTICE OF ACCEPTANCE OF BUILDING CONTRACT” in the courthouse. The 45-day lien period will not start until this document is filed.
- F. The Owner shall not approve retainage payment without the following:
 - 1. An invoice approved by the designer,
 - 2. A Consent of Surety to Final Payment (AIA Form G707),
 - 3. A Clear Lien Certificate obtained on the 46th day.
- G. The Owner requires certification by the designer that the punch listed work has been completed prior to any payment of money withheld for the Punch List.

Additional Procedures: During the close out procedures complete the following items:

- A. Advise the Owner of pending insurance changeover requirements.
- B. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner’s personnel of changeover in security provisions.
- C. Discontinue and remove temporary facilities from the site, along with mock-up, construction tools and similar elements.

MAINTENANCE

General: Provide service and maintenance of components indicated in specification section and, but not limited to the following:

- A. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion of the length of the specified warranty, whichever is longer.
- B. Examine system components at a 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 the manufacturer of the original component.
- D. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

* * * * *

End of Section 01 70 10

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide all requirements for Grades, Lines and Levels as specified herein.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Basic responsibilities of all Parties to Contract: Section 00 72 13 and Section 00 73 00
- B. Summary of Work: Section 01 11 00
- C. Field Engineering: Section 01 71 23

EXAMINATION OF PROJECT SITE

General: Contractor is requested to visit existing Project site or building, compare drawings and specifications with any Work in place and inform themselves of all conditions, including other Work, if any, being performed.

Notice: Failure to visit site will in no way relieve Contractor from necessity of furnishing any material or performing any Work that may be required to complete Work in accordance with Drawings and Project Manual specifications. Any additional work required to complete Work of Project in accordance with Drawings and Project Manual Specifications shall be done so without additional cost to Owner.

PART TWO - PRODUCTS - (Not Applicable)**PART THREE - EXECUTION****LAYING OUT OF PROJECT WORK**

General: Upon entering Project site for purpose of beginning Work, locate general reference points; take such action as is necessary to prevent their destruction; lay out Work; be responsible for lines, elevations, measurements of buildings, grading, paving, utilities, other Contract Work. Exercise proper precaution to verify figures indicated before laying out Work; errors resulting from failure to exercise precaution will be Contractor's responsibility. Notify Architect when ready to layout building so that Work may start in presence of Architect.

Verify: Verify all grades, lines, levels and dimensions as shown on the Drawings and report any errors or inconsistencies discovered in the above to the Architect before commencing work. Provide and maintain established bench marks in not less than two widely separated places.

Field Measurements: The Contractor shall take measurements in the field to verify or supplement dimensions indicated on the Drawings and shall be responsible for accurate fit of specified work.

Any discrepancy between the Drawings and the actual conditions shall be reported immediately to the Architect.

Drawings, Use of: Do not scale the Drawings. If the Contractor chooses to calculate measurements by scaling the Drawings, it is at his own risk and is not considered to be an accurate measurement. The Contractor is responsible for the accuracy of measurements, elevations, lines and grades of the Work.

* * * * *

End of Section 01 71 23.11

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: This section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:

- A. Make its several parts fit together properly.
- B. Uncover portions of the Work to provide for installation of ill-timed work.
- C. Remove and replace defective work.
- D. Remove and replace work not conforming to requirements of Contract Documents.
- E. Remove samples of installed work as specified for testing.
- F. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections.

- A. Basic responsibilities of all Parties to Contract: Section 00 72 13 and Section 00 73 00
- B. Summary of Work: Section 01 11 00
- C. Substitutions and product options: Section 01 62 00
- D. Excavating and backfilling: Section 31 23 15
- E. Cast-in-Place Concrete: Section 03 30 00

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Substitutions: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) days prior to the Bid Opening Date.

Notice: Submit a written notice designating date and time work will be executed and/or uncovered.

PART TWO – PRODUCTS

MATERIALS

General: Comply with specifications and standards for each specific product or material involved.

PART THREE - EXECUTION

INSPECTION

General: Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching. After uncovering work, inspect conditions affecting installation of Products, or performance of Work. Report unsatisfactory or questionable conditions to Architect in writing; do not proceed with Work until Architect has provided further instructions.

PREPARATION AND PROTECTION

Temporary Supports: Provide adequate support as necessary to assure structural value or integrity of affected portion of Work.

Protection: Provide devices and methods to protect other portion of Project from damage. Provide protection from elements for that portion of Project which may be exposed by cutting and patching work, and maintain any excavations free from water.

PERFORMANCE

General: Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs or replacement.

Excavations: Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

Contractor: Employ original installer or fabricator to perform cutting and patching for:

- A. Structural concrete slabs, beams or columns.
- B. Weather-exposed or moisture-resistant elements.
- C. Sight-exposed finished surfaces.

Fitting and Adjustment: Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes. Restore work which has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

Finishes: Refinish entire surface as necessary to provide an even finish to match adjacent finishes:

- A. For continuous surfaces, refinish to nearest intersections.
- B. For an assembly, refinish entire unit.

* * * * *

End of Section 01 73 29

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Throughout all phases and items of the construction period, maintain the building and site in a standard of cleanliness as described in this Section including:

- A. Cleaning Materials and Equipment
- B. Progress Cleaning
- C. Final Cleaning

Execute cleaning and waste management, during progress of Work, and at completion of Work, as required by Section 00 72 13 - "General Conditions of the Contract" and as specified herein.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Summary of Work: Section 01 11 00
- B. Cleaning for specific products or work: Project Manual Specification Section for that work.

QUALITY ASSURANCE

- A. Inspection: Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

DISPOSAL REQUIREMENTS

General: Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, anti-pollution laws and pertinent requirements of Governmental agencies having jurisdiction. Disposal of volatile fluid wastes (such as mineral spirits, oil or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART TWO - PRODUCTS**MATERIALS**

Cleaning Products: Contractor shall use only cleaning materials as follows:

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials, equipment and methods recommended by manufacturer of surface material to be cleaned.

- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
- D. Provide all required personnel, equipment and materials needed to maintain the specified standard of cleanliness.

PART THREE - EXECUTION

PROGRESS CLEANING DURING CONSTRUCTION

General: Execute periodic cleaning to keep Work, site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

- A. Retain all stored items in an orderly arrangement allowing maximum access, not impeding traffic and providing the required protection of materials.
- B. Do not allow the accumulation of scrap, debris, waste material and other items not required for the construction of this work.
- C. Twice weekly, and more often if necessary, the Contractor shall completely remove all scrap, debris and waste material from the job site and shall place into an on-site container furnished by the Contractor
- D. Remove waste materials, debris and rubbish from site periodically and dispose of at legal disposal area away from the Project site.
- E. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection.

Project Site; The Contractor shall:

- A. Daily, and more often if necessary, inspect the project site and pick up all scrap, debris and waste material. Remove all such items to the place designated for their storage.
- B. Weekly, and more often if necessary, sweep all interior places clean. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by reasonable diligence using a hand-held broom.
- C. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
- D. Clean interior spaces prior to start of finish painting and continue cleaning on an as-needed basis until painting is finished. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- E. Following the installation of finish floor materials, protect by covering with temporary coverings and / or clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material, which may be injurious to the finish floor material.

FINAL CLEANING

- A. Definition: Except as otherwise specifically provided, "Clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by commercial building maintenance Subcontractors using commercial quality building maintenance equipment and materials.
- B. General: Prior to completion of the work, remove from the job site all tools, construction equipment, machinery, temporary structures, surplus materials, scrap, debris and waste. Conduct final progress

cleaning as described in Progress Cleaning paragraph above.

- C. Exterior: Clean Project site, yard and grounds in areas disturbed by construction activities, including landscape development areas of rubbish, waste material, litter and other foreign substances.
- D. Sweep paved areas broom clean. Remove petrochemical spills, stains and other foreign deposits.
- E. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- F. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint droppings, spots, stains and dirt from finished surfaces. Use only the specified cleaning materials and equipment.
- G. Repair, patch and touch-up marred or damaged surfaces to match adjacent finishes.
- H. Clean the following if located within the project area:
 - 1. Plumbing Fixtures, Strainers and Floor Drains. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - 2. Light Fixtures and Lamps. Clean light fixtures, lamps globes and reflectors to function with full efficiency. Replace burned-out bulbs and those noticeably dimmed by hours of use and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements of new fixtures.
 - 3. Clean permanent filters and replace disposable filters if units were operated during construction. Clean ducts, blowers and coils if units were operated without filters during construction. Clean grilles and louvers.
 - 4. Excess lubrication is to be removed from mechanical and electrical equipment.
 - 5. All Electrical Panels.
- I. Clean all transparent materials, including glass and mirrors. Remove glazing compound and other substances that are noticeable from vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
- J. Remove labels that are not permanent labels.
- K. Polished and Resilient Surfaces: To all surfaces requiring the routine application of protective waxes and / or buffed polish, apply the specified coating and / or polish as recommended by the manufacturer of the material being treated, as specified in individual Specification Sections.
- L. Leave concrete floors broom clean. Vacuum carpeted surfaces.
- M. Clean areas traversed by construction personnel.
- N. Remove grease, mastic adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.
- O. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects and other pests. Prepare a report.
- P. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.
- Q. Timing: Schedule the final cleaning as approved by the Owner's Representative to enable the Owner to accept a completely clean project.
- R. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean. Owner will assume responsibility for cleaning after final acceptance of Project.

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End of Section 01 74 00

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Section includes administrative and procedural requirements for the following:

- A. Disposing of non-hazardous demolition and construction waste.

RELATED REQUIREMENTS

- A. Summary of Work: Section 01 11 00
- B. Site Demolition: Section 02 41 13
- C. Earth Moving: Section 31 20 00

DEFINITIONS

Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation or repair operations. Construction waste includes packaging.

Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

Disposal: Removal off-site of demolition and construction waste and subsequent sale recycling, reuse or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

INFORMATIONAL SUBMITTALS

Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.

WASTE MANAGEMENT PLAN

General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification and cost / revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- A. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address and telephone number of each landfill and incinerator facility.

PART TWO - PRODUCTS - (Not Applicable)

PART THREE - EXECUTION

PLAN IMPLEMENTATION

General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation and other items as required to implement waste management plan during the entire duration of the Contract.

Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways and other adjacent occupied and used facilities.

- A. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection and noise control.

DISPOSAL OF WASTE

General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

- A. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

Burning: Do not burn waste materials.

Disposal: Remove waste materials and dispose of at designated spoil areas on the Owner's property.

Disposal: Remove waste materials from the Owner's property and legally dispose of them.

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End of Section 01 74 19

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiation Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Contractor shall furnish to Architect for forwarding to Owner all Warranties, Bonds, Service and Maintenance Contracts, Spare Parts Lists and other Lists as specified herein.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Performance Bond and Labor and Material Payment Bond: General and Supplementary Conditions to the Contract.
- B. General Warranty of Construction: Section 00 72 13
- C. Contract closeout: Section 01 70 10
- D. Operating and Maintenance Data: Section 01 70 10
- E. Warranties required for specific products: Each respective section of Specifications.
- F. Provisions of Warranties; Duration: Respective section of Specifications which specifies product.

SUBMITTALS

General: Contractor shall assemble and submit Certifications, Project Record Documents, Operation and Maintenance Data, Warranties and Bonds, and parts lists, executed by each respective manufacturer, suppliers and subcontractors as specified herein. Submit in accordance with requirements of Section 01 33 23 - Shop Drawings, Product Data and Samples.

- A. Submit certifications listed below that are specifically applicable to the Project.
- B. Project Record Documents: Submit documents to Architect prior to claim for Final Application for Payment.
- C. Submit all Operation and Maintenance Data as described below.
- D. Daily Logs
- E. Submit all Warranties and Bonds as described below.

PART TWO - PRODUCTS - (Not Applicable)**PART THREE - EXECUTION****CERTIFICATIONS**

General: Submit to Architect three (3) copies of all certifications under individual headings and sections of Project Specifications; including, as they apply to the project, but not limited to following:

- A. Certificate of Completion (Fire Marshal form)
- B. Certificate of Occupancy
- C. Sprinkler Certification
- D. Fire Alarm Certification
- E. Fire Extinguishers inspected and tagged by licensed contractor (unless invoice shows they are less than one year old.)
- F. Elevator Certification
- G. Boiler Inspection
- H. Certificate of Inspection:
 - 1. Tests of electrical transformer sound levels.
 - 2. Approval of electrical work from governing authorities.
- I. As-Built Slab Survey.
- J. Elevation Certificate.

ELEVATION CERTIFICATE

General: The contractor shall provide a FEMA National Flood Insurance Program Elevation Certificate for the building or buildings. This requirement shall apply to all new or substantially improved buildings. The elevation certificate is to be completed and stamped by a licensed engineer or land surveyor strictly according to the FEMA NFIP Instructions, including the photographs and with the assumption that it is intended to support a LOMA or LOMR-F request. "Substantially improved" means any improvement the cost of which equals or exceeds 50% of the market value of the building or includes any change in floor elevation.

PROJECT RECORD DOCUMENTS

General: As-Built Drawings shall not be used for construction purposes. Protect Drawings from deterioration and loss in a secure, fire-resistant location. Provide access to As-Built Drawings for the Architect's reference during normal working hours. Keep documents current; do not permanently conceal any work until required information has been recorded. **IMPORTANT NOTE: Failure to keep As-Built Documents current is sufficient cause to withhold progress payments.**

- A. Maintain on site one (1) set of the following record documents; record actual revisions to the Work:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other modifications to the Contract
 - 5. Reviewed shop drawings, product data and samples
 - 6. Manufacturer's instruction for assembly, installation and adjusting.

As-Built / Project Record Drawings: The Contractor shall maintain one (1) clean, complete undamaged set of prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Update As-Built Drawings on a monthly basis coincident with the submittal of the Application for Payment.

- A. Label each document "PROJECT RECORD" in neat large printed letters.

- B. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark with erasable red pencil to record actual construction:
 - 1. Mark all new information that is not shown on Contract Documents.
 - 2. Depths of various elements of foundation in relation to finish first floor datum.
 - 3. Survey showing horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. The record of exterior underground utilities shall be made at the time of installation.
 - 4. Invert elevations of drainage piping.
 - 5. Surveys establishing building lines and levels.
 - 6. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - 7. Field changes of dimension and detail.
 - 8. Changes made by Field Order or by Change Order; note related change order numbers where applicable.
 - 9. Details not on original Contract Drawings.
 - 10. Required Copies: Two (2) print / hard copy and scan all As-Built Drawings and provide to the Owner in digital form on one (1) CDs (compact disks).
- D. Specifications and Addenda: Legibly mark each Section to record:
 - 1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.
 - 2. Changes made by Field Order or by Change Order; note related change order numbers
 - 3. Give particular attention to equals and substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.

OPERATION AND MAINTENANCE DATA

General: Compile operation and maintenance data and related information appropriate for the Owner's operation and maintenance of each product or system.

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

General: Compile operation and maintenance data for materials and finishes for the Owner's future use.

- A. For Each Product, Applied Material and Finish:
 - 1. Product data with catalog number, size, composition and color and texture designations.
 - 2. Information for re-ordering custom manufactured products.

- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition and details of installation. Provide recommendations for inspections, maintenance and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

General: Compile operation and maintenance data for equipment and systems for the Owner's future use.

- A. For each Item of Equipment and Each System:
 - 1. Description of unit or system and component parts.
 - 2. Identify function, normal operating characteristics and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down and emergency instructions. Include summer, winter and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting: disassembly, repair and reassembly instructions; and alignment, adjusting, balancing and checking instructions.
- G. Provide servicing and lubrication schedule and list of lubricants, fuels and tools required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Provide control diagrams by controls manufacturer as installed.
- J. Include sequence of operation by controls manufacturer.
- K. Provide original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
- L. Additional Requirements: As specified in individual product specification sections.

DAILY LOGS

General: Submit compiled, maintained Daily Logs including all required information listed in Section 01 31 00 "Project Management and Coordination".

ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS AND DAILY LOGS

General: Prepare operation and maintenance manuals in the following manner for the Owner's use:

- A. Assemble operation and maintenance data into durable manuals for the Owner's personnel use, with data arranged in the same sequence as and identified by, the specification sections.
- B. In addition to hard copy manuals, the Contractor shall scan all data assembled and provided to the Owner in digital form on two (2) CDs (compact disks).
- C. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- D. Binders: Commercial quality, 8 1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- E. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- F. Project Directory: Title and address of Project; names, addresses and telephone numbers of Architect, Consultants, Contractor and Subcontractors with names of responsible parties.
- G. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Table of Contents in each volume, with the current volume clearly identified.
- H. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- I. Text: Manufacturer's printed data or typewritten data on 20 pound paper.
- J. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert in pocket folders.
- K. Arrangement of Contents: Organize each volume in parts as follows:
 1. Project Directory.
 2. Table of Contents, of all volumes and of this volume.
 3. Operation and Maintenance Data: Arrange by system, then by product category.
 - i. Source data.
 - ii. Product data, shop drawings and other submittals.
 - iii. Operation and maintenance data.
 - iv. Field quality control data.
 - v. Photocopies of warranties and bonds.
 4. Accompany submittal with transmittal letter.

WARRANTIES AND BONDS

General: Obtain, execute and submit all Warranties and Bonds in the following manner:

- A. Obtain warranties and bonds, executed in triplicate by responsible Subcontractors, suppliers and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with the Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- C. Verify that documents are in proper form, contain full information including correct project name and are notarized.
- D. Co-execute submittals when required.
- E. Retain warranties and bonds until time specified for submittal.
- F. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

* * * * *

End of Section 01 78 00

– GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

RELATED REQUIREMENTS

General: Following related requirements are included or specified in other sections:

- A. Refer to individual sections for items listed herein, as well as other requirements.

PART TWO - PRODUCTS**EXTRA MATERIALS****General:**

- A. At the time of building acceptance, deliver to the Owner the following extra materials. Deliver in original unopened cartons or containers with each item properly identified.

Acoustic Tile Ceilings:

- A. Furnish replacement stock amounting to one full box (minimum 12 tiles) of each type.

Painting and Special Coatings:

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage.
 - a. Quantity: Furnish the Owner with two gallons of each material and color applied in addition to any leftover amounts.
 - b. All cans shall be labeled with Finish Index number.

PART THREE – EXECUTION - (Not Applicable)

* * * * *

End of Section 01 74 00

PART ONE – GENERAL**SUMMARY**

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure in the base bid.
 - 2. Salvage of existing items to be reused or recycled.
 - 3. Extent of selective demolition work is indicated on Drawings.
- B. Related Work Specified Elsewhere:
 - 1. Cutting non-structural concrete floors and masonry walls for underground piping and ducts, and for above grade piping, ducts, and conduit is included with the work of the respective plumbing, HVAC and electrical Divisions 22, 23, 26 and 27 Specification Sections, unless noted otherwise on the Drawings or in the Specifications.
 - 2. Remodeling construction work and patching is included within the respective Sections of Specifications, including removal of materials for reuse and incorporated into remodeling or new construction.
 - 3. Relocation of pipes, conduits, ducts, and other mechanical and electrical work are specified by respective trades.
- C. Related Sections
 - 1. Section 01 73 29 - Cutting and Patching
 - 2. Section 01 74 00 - Cleaning & Waste Management
 - 3. Division 21 - 49 Sections

DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner's property.
- B. Remove and Salvage: Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to Owner's designated storage area. Items indicated to be removed and salvaged remain the Owner's property.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed. Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

SUBMITTALS

- A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to the Architect for review prior to commencement of work. Include start and end dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 1. Schedule shall indicate the following:
 - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure the Owner's on-site operations are uninterrupted.

- b. Interruption of utility services to be no more than 48 hours and over a weekend or holiday.
 - c. Coordination for shutoff, capping, and continuation of utility services.
 - d. Use and protection of elevator and stairs.
 - e. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 - f. Coordination of the Owner's continuing occupancy of portions of existing building.
 - g. Means of protection for items to remain and items in path of waste removal from building.
- B. Inventory: Provide inventory of items to be removed and salvaged or removed by owner.

QUALITY ASSURANCE

- A. In addition to complying with all pertinent codes, the Contractor will also comply with the requirements of those insurance carriers providing coverage for the existing building and this work.
- B. Regulatory Requirements: Comply with governing [EPA](#) notification regulations before starting selective demolition. Comply with hauling disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with [ANSI](#) A10.6 and [NFPA](#) 241.
- D. Contractor shall provide methods to ensure pollution control during the demolition period.
- E. If unanticipated mechanical, electrical, or structural elements which conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect rearrange selective demolition schedule as necessary to continue overall job progress without delay.
- F. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in "Standard Conditions of Contract for Construction". Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

PROJECT CONDITIONS

- A. Occupancy: The Owner will be continuously occupying areas of building / adjacent buildings immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of the Owner's normal operations. Provide a minimum of two weeks advance notice to the Owner of demolition activities which will severely impact upon the Owner's normal operations.
- B. Maintain access to existing walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Condition of Structures: The Owner assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Notify the Owner's Representative of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 - 1. Under no circumstances will any persons connected with this project use any adjacent property outside the property limits for the purpose of storing or selling demolition materials.
- E. Protections: Provide temporary barricades and other forms of protection as required to protect Owner personnel and the general public from injury due to selective demolition work.
 - 1. Erect temporary covered passageways as required by authorities having jurisdiction.
 - 2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished, and adjacent facilities or work to remain.
 - 3. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 - 4. Protect floors with suitable coverings when necessary. Use rubber-tired vehicles for conveying materials in building.
 - 5. Construct temporary insulated solid dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks if required.
 - 6. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces, and installation of new construction to insure that no water leakage or damage occurs to structure or interior areas of existing building.
 - 7. Temporary Fire Protection: Provide fire extinguishers of rated capacities and types appropriate for demolition work being conducted within construction areas, but not less than one (1) multipurpose dry chemical fire extinguisher UL-rated 4-A:60-B-C, 10-lb (4.5-kg) nominal capacity of any demolition work, or as required by local authority having jurisdiction. All combustible waste removed continuously. No smoking allowed. No device above 180 degrees F. allowed.
 - 8. Remove protections at completion of work.
- F. Damages: Promptly repair damages caused to adjacent facilities by demolition work at no cost to the Owner.

UTILITY SERVICES:

- A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Owner's Representative. Provide temporary services during interruptions to existing utilities, as acceptable to the Owner's Representative.
- C. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution. Any water damage to portions of building to remain shall be repaired to original condition at not cost to the Owner.
- D. Maintain fire-protection facilities in service during selective demolition operations.

TRAFFIC

- A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

- B. Do not close, block or otherwise obstruct streets, walks or other occupied or used facilities without written permission from Owner and other authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by the Owner and other governing regulations.

EXPLOSIVES

- A. Use of explosives will not be permitted.

HAZARDOUS MATERIALS

- A. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before the start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner's Representative. Hazardous materials will be removed by Owner under a separate contract.

PART TWO – PRODUCTS

GENERAL

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

TEMPORARY DUST AND PROTECTION PARTITIONS

- B. Dust partition shall be constructed as described within the Contract Drawings and shall be provided in all locations necessary and as directed by the Owner, or as required for protection of existing adjacent finished surfaces, new construction, furniture, etc. Partitions and enclosures shall be erected prior to commencing demolition or alteration work and shall be removed as soon as the work is complete.
- C. Dust Protection Materials
 - 1. Refer to Section 01 56 16 – Temporary Dust Protection

PART THREE – EXECUTION

EXAMINATION

- A. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with the Owner's Representative prior to starting work.
- B. Verify that utilities have been disconnected and capped.

PREPARATION

- A. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
- A-B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1. Cease operations and notify the Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- ~~2. Cover and protect~~ equipment and fixtures to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed. Covers shall be dust-tight and secured to prevent dust from construction operations contaminating the furniture, furnishings, and equipment being protected.
- ~~3. Erec~~t and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
4. Provide weatherproof closures for exterior openings resulting from demolition work.
- ~~5. Locate~~, identify, stub off and disconnect utility services that are not indicated to remain.
6. Provide by-pass connections as necessary to maintain continuity of service to occupied areas of building. Provide a minimum of two weeks advance notice to the Owner if shut-down of service is necessary during change-over.
- ~~7. Drain~~, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors or framing.
 3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
 4. Remove decayed, moldy, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 5. For interior concrete slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
 6. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved compacted material.
 7. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Temporarily cover openings to remain.
 8. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations.
 - a. Maintain adequate ventilation when using cutting torches.
 - b. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 9. Acoustical Tile Ceilings: Where complete removal is indicated, remove all components including wire hangers. Concrete inserts, strap hangers and trapeze assemblies may be retained in place re-used provided they are and remain in full compliance with requirements for new work, including proof load testing, spacing, and types indicated.

- a. Refer to Section 09 51 23 – “Acoustical Tile Ceilings” for additional requirements.
10. Remove resilient floor coverings and adhesive according to recommendations of the Resilient Floor Covering Institute's ([RFCI](#)) "Recommended Work Practices for the Removal of Resilient Floor Coverings" and Addendum.
 - a. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by [RFCI](#) and approved by manufacturer of new floor coverings.
 - b. [Do not use methods requiring solvent-based adhesive strippers](#)
 - c. [Refer to Section 09 65 00 – “Resilient Flooring” for additional requirements.](#)
11. Roofing:
 - a. [Refer to Division 07 – Thermal and Moisture Protection Sections for additional requirements.](#)

POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.
- C. Clean adjacent areas, structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

SALVAGE MATERIALS

- A. All demolished material shall first be offered to the Owner. If not desired by the Owner, materials shall become Contractor's property to be removed from site and resold as described below. Items not resold shall be disposed of by the Contractor at the Contractor's expense unless noted otherwise on the Drawings.
 1. Items having resale value, including but limited to: Furniture; Carpet and carpet padding; Artwork; Furnishings; and other items of similar nature shall be liquidated on behalf of the Owner. The fair market value shall be determined and the cost benefit shall be incorporated into the Contractors Bid for this Work. This amount shall be listed as a separate item on the Bid Proposal.
- B. Historic items, relics, artifacts, including cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historic significance remain the property of the Owner. Notify the Owner's Representative if such items are encountered and obtain acceptance regarding method of removal and salvage for the Owner.

REMOVED AND REINSTALLED MATERIALS

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

DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from Project site and legally dispose of them in an [EPA](#)-approved landfill.
- B. Remove debris, rubbish and other materials resulting from demolition operations from building site as soon as possible. Storage of this material will not be permitted on the site. Transport and legally dispose of materials off site, without spillage on public streets.
 - 1. Vehicles: To prevent littering of streets, cover open vehicles carrying debris from the building site.
 - 2. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution.
 - 3. Burning of removed materials is not permitted on project site.

CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment and demolished materials from site. Remove protections and leave interior areas broom clean.
- B. Repair demolition performed in excess of that required. Return structures and surfaces to remain to condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new construction as indicated on the Drawings.
 - 1. Patching is specified in Section 01 73 29 – Cutting and Patching.

* * * * *

End of Section 02 41 19.13

PART 1 – GENERAL**1.01 SUMMARY**

- A. This section includes surface preparation, mechanical grinding and polishing of concrete slabs, and application of a penetrating urethane coating.
- B. Work includes:

1. Wet diamond grinding to low grit finish (30–50 grit).
2. 100 grit diamond polishing pass.
3. Application of Ameripolish® Penetrating Modified Urethane

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data sheets for each product used.
- B. Samples: Provide minimum 24" x 24" mock-up showing specified grind, polish, and coating finish.
- C. Maintenance Instructions: Provide maintenance procedures and recommended cleaning products.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have a minimum of 5 years of experience with concrete grinding and polishing systems.
- B. Mock-Up: Provide a mock-up demonstrating the full system including grinding, polishing, and coating for Architect approval. Maintain approved mock-up for standard comparison.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials in manufacturer's original, unopened containers with identification labels intact.
- B. Store materials in a clean, dry location at temperatures and conditions recommended by manufacturer.

1.05 PROJECT CONDITIONS

- A. Ensure all concrete has cured a minimum of 28 days prior to grinding or coating.
- B. Do not apply coatings when ambient or surface temperatures are below 50°F or above 90°F.
- C. Protect adjacent surfaces and finishes during grinding and coating operations.

PART 2 – PRODUCTS**2.01 MATERIALS****A. Grinding Equipment:**

1. Commercial-grade wet diamond grinding machines capable of low grit (30–50) operation.
2. Equipment shall include integrated water delivery and slurry collection systems.

B. Polishing Equipment:

1. Commercial-grade concrete polishers with 100 grit diamond abrasives.
2. Equipment shall be capable of achieving an even, refined surface.

C. Concrete Coating:

1. **Ameripolish® Penetrating Modified Urethane** (or Approved Equal)
 - a. Type: Solvent-based penetrating urethane sealer
 - b. VOC Compliant: Yes (in compliance with federal, state, and local requirements)
 - c. Finish: Satin
 - d. Properties: Chemical-resistant, abrasion-resistant, breathable, UV-stable
 - e. Manufacturer: Ameripolish, Inc. (www.ameripolish.com)

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that concrete surfaces are ready for grinding and coating.
- B. Confirm surfaces are free of curing compounds, adhesives, grease, sealers, and coatings.

3.02 PREPARATION

- A. Perform wet diamond grinding with 30–50 grit diamonds to remove surface contaminants and laitance.
- B. Remove all slurry and allow surface to dry completely before proceeding.
- C. Perform 100 grit diamond polishing pass to refine surface texture and prepare for coating.
- D. Clean and vacuum surface thoroughly to remove all dust and residue.

3.03 COATING APPLICATION

- A. Apply Ameripolish® Penetrating Modified Urethane in accordance with manufacturer's written instructions.
- B. Apply by pump sprayer or roller, ensuring uniform coverage.
- C. Allow specified cure time between coats and before allowing foot or equipment traffic.
- D. Apply additional coat(s) if required to meet performance and sheen requirements.

3.04 CLEANING AND PROTECTION

- A. Protect newly finished surfaces from staining or damage during construction.
- B. Do not allow water or construction debris to remain on finished floor.
- C. Final clean using manufacturer-approved products and procedures.

* * * * *

END OF SECTION 03 35 50

PART ONE – GENERAL**RELATED DOCUMENTS:**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

Note: The provisions of Section 04 20 10 - "Unit Masonry Procedures" apply to Work under this Section.

WORK INCLUDED:

General: Provide Masonry Mortar indicated as specified herein.

RELATED WORK:

General: Following items of related work are included in other sections.

- A. Masonry mortar and grout: Section 04 05 13
- B. Masonry anchors and reinforcement: Section 04 05 23
- C. Unit Masonry Procedures: Section 04 20 10
- D. Joint sealants: Section 07 92 00

QUALITY ASSURANCE:

Sample Panels: Provide in-place Masonry Mortar samples in accordance with Sample Panel requirements noted in other Unit Masonry Sections. See Related Work article for list of all unit masonry sections included in Project Specifications.

Source Quality Control: Brands of cementitious materials and source of sand and gravel aggregates shall remain same through-out entire Project and shall not be changed except by written permission of Architect.

SUBSTITUTIONS:

General: For products specified herein, Bids shall be based on products named in the Project Manual, or on items which the Architect has designated as an "approved equal". A product not named in the Project Manual or that is not approved by the Architect, in accordance with FP&C procedure in 4.3 Instruction to Bidders, shall not be acceptable. No substitutions shall be allowed after bids are received.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 33 23 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY, STORAGE AND HANDLING:

General: Deliver and store Masonry Mortar in accordance with Delivery, Storage and Handling requirements of Section 04 20 10 - "Unit Masonry Procedures".

PROJECT CONDITIONS:

General: In accordance with Project Conditions of Section 04050 - "Unit Masonry Procedures".

PART TWO - PRODUCTS

MASONRY MORTAR MATERIALS:

Mortar Type: Conform to ASTM C-270, Type "N" proportion specification.

Mortar Materials: Materials used as ingredients in Masonry Mortar shall conform to following specified requirements:

- A. Portland Cement: ASTM C-150, Type 1.
- B. Hydrated Lime: ASTM C-207, Type S.
- C. Sand: ASTM C-144.
- D. Admixtures: No air-entraining admixtures or cementitious materials containing air- entraining admixtures shall be used in mortar. No anti-freeze compounds or other substances shall be used in mortar to lower freezing point. Calcium chloride or admixtures containing calcium chloride shall not be used in mortar in which reinforcement, metal ties or anchors are embedded. Mortar colors may be added if so specified herein.
- E. Water: Water shall be clean and free of deleterious amounts of acid, alkalies or organic materials.

Mortar Mix: 1 part Portland cement, 1 part hydrated lime and not less than 4-1/2 parts and not more than 6 parts **WHITE** sand.

Mortar Color: Match existing.

MASONRY GROUT FILL:

Grout Materials: Materials used as ingredients in masonry grout shall conform to following specified requirements.

- A. Portland Cement: ASTM C-150, Type 1.
- B. Hydrated Lime: ASTM C-207, Type S.
- C. Sand (Fine Aggregate): ASTM C-144.
- D. Gravel (Course Aggregate): ASTM C-404; max. size 3/8 inch.
- E. Admixtures: No air-entraining admixtures or cementitious materials containing air- entraining admixtures shall be used in masonry grout. No anti-freeze compounds or substances shall be used masonry grout to lower freezing point. Calcium chloride or admixtures containing calcium chloride shall not be used in mortar in which reinforcement, metal ties or anchors are embedded.
- F. Water: Water shall be clean and free of deleterious amounts of acid, alkalies or organic materials.

Grout Strength: 28 day compressive strength - 2500 psi.

Grout Slump: 8 inch to 10 inch per ASTM C-143.

Grout Mix: 1 part Portland cement, 1/10 part hydrated lime, 3 parts sand, 2 parts gravel and enough water to produce specified slump.

PART THREE - EXECUTION

MIXING:

Measurement of Materials: The method of measuring materials for masonry mortar or grout in masonry construction shall be by either volume or weight, and such that specified proportions of masonry mortar or grout materials can be controlled and accurately maintained.

Note: Measurement of sand by shovel shall not be permitted.

Mixing of Mortar Materials: All cementitious materials and aggregate shall be mixed for at least 3 minutes and not more than 5 minutes in a mechanized batch mixer, with maximum amount of water to produce a workable consistency.

Mixing of Grout Materials: All cementitious materials and aggregate shall be mixed for at least 3 minutes and not more than 5 minutes in a mechanical batch mixer, with maximum amount of water to produce specified slump.

Retempering of Mortar: Mortars that have stiffened because of evaporation of water from masonry mortar shall be retempered by adding water as frequently as needed to restore required consistency. Mortars shall be used and placed in final position within 2-1/2 hours after initial mixing.

PLACEMENT:

Placement of Mortar: Follow requirements for Laying-Up Masonry Construction as specified in Section 04 20 10 - "Unit Masonry Procedures".

Placement of Masonry Grout Fill: Follow requirements for Bond Beams and/or Reinforced Masonry Construction as specified in Section 04 20 10 - "Unit Masonry Procedures".

POINTING AND CLEANING:

General: Follow requirements for Pointing and Cleaning as specified in Section 04 20 10 - "Unit Masonry Procedures".

PROTECTION:

General: Follow requirements for Protection as specified in Section 04 20 10 - "Unit Masonry Procedures".

* * * * *

End of Section 04 05 13

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

Note: The provisions of Section 04 20 10 - "Unit Masonry Procedures" apply to Work under this Section.

WORK INCLUDED

General: Provide Masonry Accessories indicated and as specified herein.

RELATED WORK

General: Following items of related work are included in other sections.

- A. Masonry mortar and grout: Section 04 05 13
- B. Masonry anchors and reinforcement: Section 04 05 23
- C. Unit Masonry Procedures: Section 04 20 10
- D. Concrete block: Section 04 22 00
- E. Joint sealants: Section 07 92 00

SUBMITTALS

General: Submit to Architect all required submittals in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Submit copies of product data on all pre-manufactured masonry accessories specified herein.

Shop Drawings: Submit shop drawings for masonry reinforcing steel for approval; do not fabricate or deliver masonry reinforcing steel until shop drawings are approved unless such approval is waived in writing by Architect.

- A. Drawings: Indicate bending diagrams, assemble diagrams, splicing, laps of rods, shapes, dimensions, details of bar reinforcement.
- B. Preparation of Drawings: Prepare drawings in accordance with "Manual of Standard Practice for Detailing Reinforced Concrete Structures, ACI 315."
- C. Note: Do not use scaled dimensions from Drawings in determining lengths of reinforcement.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in the Project Manual, or on items which the Architect has designated as an "approved equal". A product not named in the Project Manual or that is not approved by the Architect, in accordance with FP&C

procedure in 4.3 Instruction to Bidders, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY STORAGE AND HANDLING

General: Deliver and store Masonry Accessories in accordance with Delivery, Storage and Handling requirements of Section 04 20 10 - "Unit Masonry Procedures".

PROJECT CONDITIONS

General: In accordance with Project Conditions requirements of Section 04 20 10 - "Unit Masonry Procedures".

PART TWO - PRODUCTS

JOINT REINFORCEMENT

Acceptable Manufacturers: AA Wire Products, Masonry Reinforcing Corp., Heckman Building Products, Dur-O-Wal, or approved equal. The following specified materials based on product numbers of Dur-O-Wal, Inc.

Joint Reinforcement: Prefabricated truss type, manufactured from cold drawn steel wire conforming to ASTM A-82.

- A. **Finish:** Mill galvanized finish for corrosion resistance.
- B. **Size:** The distance between side rods to be approximately 2 in. less than indicated wall width.
- C. **Single Wythe Joint Reinforcement:** Standard Dur-O-Wal Truss Type.
- D. **Cavity Wall Joint Reinforcement:** Standard Dur-O-Wal Trirod Truss Type with drip.

Corner and Tee-Joint Reinforcement: Use prefabricated corner, and tee Sections to form continuous reinforcement around corners and for anchoring abutting walls and partitions. Materials in corner and tee sections to correspond to type, and design of joint reinforcement used.

ANCHORS AND TIES

Acceptable Manufacturers: AA Wire Products, Masonry Reinforcing Corp., Heckmann Building Products, or approved equal. The following materials based on product numbers of Heckmann Building Products, Inc., Chicago, Illinois.

Finish: Mill galvanized finish for corrosion resistance.

General: Provide 2-piece assemblies allowing vertical or horizontal differential movement between veneer and wall framing parallel to plane of wall but resisting tension and compression forces perpendicular to it, for attachment over sheathing to metal studs, and with the following structural performance characteristics:

- A. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in either tension or compression without developing play or deforming more than 0.05 inch (1.3 mm).

Materials: Provide masonry-veneer anchors of the following materials and thicknesses, unless otherwise indicated:

- A. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
 - 1. Wire Diameter: 0.1875 inch (4.8 mm).
- B. Galvanized Steel Sheet: ASTM A 653, G60 (ASTM A 653M, Z180), commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.
 - 1. Thickness: 0.0785 inch (2.0 mm).
- C. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire-tie section and a metal-anchor section complying with the following requirements:
 - 1. Wire-Tie Shape: Rectangular.
 - 2. Wire-Tie Length: As required to extend to within 1-1/2 inches (38 mm) of face of stone masonry veneer.
 - 3. Wire-Tie Length: As indicated.
 - 4. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 0.0747 inch (1.9 mm) thick by 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; fabricated into a T-shape with 2 projecting tabs, 3/4 inch (19 mm) wide by 1 inch (25 mm) long; with slotted holes for connecting vertical legs of triangular wire tie specially formed to fit anchor section.
- D. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm) diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, and with the following corrosion- protective coating:
 - 1. Organic polymer coating with salt-spray resistance to red rust of more than 500 hours per ASTM B 117.
- E. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Screw-Attached, Masonry-Veneer Anchors:
 - a. D/A 213; Dur-O-Wal, Inc.
 - b. Pos-I-Tie; Heckman Building Products, Inc.
 - 2. Organic-Polymer-Coated, Steel Drill Screws:
 - a. Dril-Flex; Elco Industries, Inc.
 - b. Kwik-Flex; HILTI, Corp.
 - c. Traxx; ITW-Buildex.
 - d. Perma-Seal Coated Twin-Fast; Rawlplug Co., Inc. (The).

Dovetail Anchor System: As follows:

- A. Dovetail Anchor Slots: 22 gauge Dovetail Anchor Slot, with Styrofoam fill.
- B. Dovetail Anchors: 1/8 inch anchor with 3/16 inch triangular wire tie, Dovetail triangle type tie.

MASONRY GROUT FILL REINFORCEMENT

Steel Reinforcing Bars: Supplied as part of Section 03 20 00 - "Concrete Reinforcement".

Steel Type: ASTM A-615, Grade 60.

CONTROL JOINT MATERIAL

Acceptable Manufacturers: AA Wire Products, Masonry Reinforcing Corp, Dur-O-Wal, Jim Taylor, Inc., or approved equal. The following specified materials based on product numbers of Dur-O-Wal, Inc., Baltimore, Maryland.

Control Joint Material: ASTM D-2287 Polyvinyl Chloride (PVC); Type: PVC 654-4 that meets following requirements.

- A. Hardness: 85+5 Durometer A-ASTM D-2240.
- B. Cold Crack Brittleness: 10oC, ASTM D-746.
- C. Note: Materials to be resistant to oils and solvents.

Joints in 8 Inch Concrete Masonry Walls: Dur-O-Wal No. 8 wide flange (PVC) formed with one (1) convex side for sealant backing and one (1) concave side for a finished joint appearance.

CAVITY DRAINAGE

Acceptable Manufacturers: Mortar Net, CavClear, Driwall, or approved equal.

General: Provide positive masonry cavity drainage with 3-dimensional, non-woven mesh. Product to have no negative reaction to PVC, polyethylene, polystyrenes, copper, lead, rubberized asphalt or stainless steel and will not degrade or decompose over the life of the building. It will not absorb or trap moisture and water and it will not support mold or fungus.

PART THREE - EXECUTION

PREPARATION

General: Follow requirements for Product Preparation as specified in Section 04 20 10 - "Unit Masonry Procedures".

INSTALLATION

General: Follow requirements for Placement of Masonry Accessories as specified in Section 04 20 10 - "Unit Masonry Procedures".

* * * * *

End of Section 04 05 23

PART ONE – GENERAL**RELATED DOCUMENTS:**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED:

General: Unit Masonry Procedures and general requirements specified herein apply to all Unit Masonry Work specified in other Division 4 Sections and all other items specified in other sections to be installed under Division 4 Sections.

RELATED WORK:

General: Following items of related work are included in other sections:

- A. Masonry mortar and grout: Section 04 05 13
- B. Masonry anchors and reinforcement: Section 04 05 23
- C. Unit Masonry Procedures: Section 04 20 10
- F. Concrete block: Section 04 22 00
- J. Joint sealants: Section 07 92 00

QUALITY ASSURANCE:

Installer Qualifications: For actual cutting and placing of all Unit Masonry Work, use only skilled journeyman masons who are thoroughly experienced with materials and methods specified and thoroughly familiar with Project design requirements. Provide one skilled journeyman mason who shall be present at all times during execution of Work specified in masonry specification sections and who shall personally direct execution of this portion of Work.

SUBMITTALS:

General: As specified and/or indicated in other Division 4 Sections, submit to Architect all required submittals in accordance with Section 01 33 23 - "Submittals and Shop Drawings".

SUBSTITUTIONS:

General: For products specified herein, Bids shall be based on products named in the Project Manual, or on items which the Architect has designated as an "approved equal". A product not named in the Project Manual or that is not approved by the Architect, in accordance with FP&C procedure in 4.3 Instruction to Bidders, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of

Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY, STORAGE AND HANDLING:

Acceptance: Deliver and store products in manufacturer's original, unopened packaging, with each product package legibly identified with manufacturer's name, product name and grade and contents.

Unit Masonry Protection: Shall be as follows:

- A. **Note:** During freezing weather, protect all masonry units with tarpaulins or other suitable covering materials.

Masonry Mortar Protection: Store cement, lime, other moisture degrading materials and sand in a manner to prevent hydration, contamination, mixing, deterioration, or intrusion of foreign matter.

Masonry Accessories Protection: Store masonry accessories materials to protect masonry accessories from contamination by rusting, contact with oils or any other foreign matter.

PROJECT CONDITIONS:

Masonry Pre-Installation Meeting: Prior to installation of masonry a Masonry Pre-Installation Meeting at Project site shall be held in accordance with requirements of Section 01 31 19 - "Project Meetings".

Environmental Requirements: Do not lay unit masonry when temperature of outside air is below 40 degrees F. unless suitable means, as approved by the Architect, are provided to heat materials, and to protect the Work from cold, frost and to insure that mortar will harden without freezing.

Note: Do not use any anti-freeze admixture in masonry mortar.

PART TWO - PRODUCTS

MASONRY MATERIALS:

General: Provide masonry materials as specified and/or required by other related unit masonry sections. See Related Work article for list of all unit masonry sections and related sections included in Project Specification.

MASONRY CLEANING MATERIALS:

Acceptable Manufacturers: Prosoco, Inc., 3741 Greenway Circle, Lawrence, KS 66046 or
Diedrich Technologies, Inc., 310 Wayto Road, Schenectady, NY 12303

Brick Masonry Cleaning Agent: Sure Klean Vana Trol or 202 Vana-Stop

PART THREE - EXECUTION

INSPECTION:

General: Examine areas and conditions under which all unit masonry work will be performed. Notify Contractor and Architect in writing of any detrimental conditions prior to installation. Do not proceed until unsatisfactory conditions have been corrected.

COORDINATION:

General: Consult with other trades in advance to make provisions for installation of their work in order to avoid cutting and patching. Build in work as specified in other Sections and/or indicated on the Drawings as Work progresses.

PREPARATION:

General: Prepare masonry materials for installation as required by other related unit masonry sections.

Wetting Masonry Units: Where masonry units are specified to be wetted; uniformly wet units 3 to 4 hours prior to use in hot weather and 18 to 24 hours in normal weather.

Masonry Anchors and Reinforcement: Prior to being placed, clean and remove any loose rust, ice, mud and/or any other coatings.

Cutting of Masonry Units: Cut all exposed masonry units with a motor-driven masonry saw.

INSTALLATION:

Erection: Lay up unit masonry walls plumb, level and true to line and dimensions indicated.

Pattern Bond: Refer to bond requirements of related unit masonry specification sections.

Adjustments: Adjust masonry unit to final position while mortar is soft and plastic. Where adjustments must be made after mortar has started to harden, remove mortar, and replace with fresh mortar. Avoid over-plumbing, pounding of corners and/or jambs after being set into position.

Joining of Work: When joining fresh masonry to set or partially set masonry construction, clean exposed surface of set masonry and remove loose mortar prior to laying fresh masonry. If necessary to stop off a horizontal run of masonry, rake back 1/2 unit of masonry length in each course. Do not use toothing to join new masonry, to set or partially set masonry when continuing a horizontal run.

Tooling of Joints: Tool exposed joints when "thumb-print" hard with proper tool, slightly larger than width of joint.

Flashing: Clean surface of masonry smooth and free from projections which might puncture flashing material. Construct as indicated, use flashing material as specified in Section 07 65 00 - "Wall Flashing".

Damaged Units: Do not use chipped or broken units. If any such broken units are discovered in finished wall, Architect may require their removal and replacement with new units at no additional cost to Owner.

Solid Masonry Units: Lay all solid masonry units in full bed of mortar with full head joints.

Hollow Masonry Units:

- A. Lay hollow masonry units 4 inch or less in thickness in full beds of mortar with full head joints.
- B. Lay hollow masonry units exceeding 4 inch in thickness with divided bed and head joints.

Collar Joints: Collar joints in exterior wall shall be completely filled with mortar.

Weep Holes: Provide weep holes 24 inch o.c. maximum in exterior brick masonry, weep holes to be in vertical joints immediately above all wall flashing, at base of cavity brick veneer walls. Use sash cord, trim flush with joint when mortar has set.

Cavity Wall Air Space: Keep air space within cavity wall clean, free from obstructions. Provide positive means of catching mortar droppings.

Built-In Work: Set steel lintels in beds of mortar. Fill jambs, heads of bucks and frames solid with mortar. Adjust shelf angles to keep masonry level and at proper elevation.

Sealant Recesses: Leave joints around exterior perimeters of exterior doors, window frames and other wall openings:

- A. Depth: uniform 3/4 inch.
- B. Width: 1/4 inch to 3/8 inch.
- C. Sealant: Seal as indicated, use sealant as specified in Section 07 92 00 - "Caulking and Sealants".

Control Joints: Where indicated and/or specified, install masonry control joints as follows:

- A. Location: Install masonry control joints as indicated; if no locations are shown, install in locations directed and spaced not to exceed 40'-0" o.c. maximum
- B. Construction: Construct as indicated, use special control joint material as specified in Section 04 05 23 - "Masonry Accessories".
- C. Sealant: Seal as indicated, use sealant as specified in Section 07 92 00 - "Caulking and Sealants".

Joint Reinforcement: Where indicated on the Drawings and/or specified herein, install specified joint reinforcements as follows:

- A. General: Place joint reinforcement continuous, at 16 inch o.c. intervals vertically, except it shall not pass through vertical masonry control joints. Lap side rods a min. of 6 inches at splices. Place joint reinforcement to assure min. 5/8 inch mortar cover on exterior face of walls, min. 1/2 inch mortar cover on interior face of walls.
- B. Joint Reinforcement at Masonry Openings: Place joint reinforcement in 3 consecutive courses immediately below impending structural member at top of wall such as bond beams. Place reinforcement in first and second bed joints 8 inch apart immediately above lintels; below sills at openings. Extend reinforcement in second bed joint above and below openings at least 2'-0" beyond jambs.

Bonding and Anchorage: Where indicated on Drawings and/or specified herein, install specified masonry bonding and/or masonry anchorage systems as follows:

- A. Masonry Wall Corners: Bond or anchor corners and intersections of non-load bearing and load bearing masonry walls at 16 inch o.c. vertically with preformed corner joint reinforcement.
- B. Masonry Walls: Structurally bond single wythe and multiwythe masonry walls with continuous prefabricated joint reinforcement; spaced not more than 16 inch o.c. vertically.
- C. Masonry Walls to Structural Steel: Where indicated anchor walls, partitions abutting or facing against structural steel with flexible anchors and ties as follows:
 - 1. Columns: Unless indicated otherwise, maximum spacing 16 inch o.c. vertically, weld anchor to column.
 - 2. Beams: Unless indicated otherwise, maximum spacing 24 inch o.c. horizontally, weld anchor to beam.
- D. Masonry Veneer to Metal Studs: Attach anchors to metal studs through sheathing with two (2) self-tapping screws (refer to requirements of Section 04 05 23 – Masonry Accessories for screw type). Maximum spacing of ties as follows:
 - 1. 16 inch o.c. horizontally, 24 inch o.c. vertically (30 psf wind loading)

POINTING AND CLEANING OF WALLS

Pointing: Point up exposed masonry, fill holes and joints. Remove loose mortar, cut out defective joints and repoint with mortar.

General Cleaning: Thoroughly clean all exposed masonry work:

Face Brick: Before using any cleaning method on entire exterior brick masonry wall surfaces; apply to a sample wall area of approximately 20 sq. ft. in location approved by Architect. Do not proceed with cleaning of brick masonry until cleaning sample area is approved by Architect. Use approved cleaning method and cleaning materials on remaining exterior brick masonry wall area as follows:

- A. Cleaning Method: Clean initially with stiff brush and water. If additional cleaning requires a masonry cleaning agent: Follow brick manufacturer's recommendations, thoroughly wet surface of brick on which no green efflorescence appears, scrub with masonry cleaning agent, rinse immediately with clear water; do cleaning work in small sections at a time, always working from top to bottom.
- B. Efflorescence Cleaning: Remove green efflorescence in accordance with brick masonry manufacturer's recommendations.
- C. Other Stain Cleaning: Where required, remove lime, ferrous metal and/or asphalt stains with appropriate formulation of brick masonry cleaning agent.
- D. Note: Do not use acid solutions for cleaning brick masonry units unless specifically approved in writing by Architect.

Cleaning Schedule: Schedule complete masonry cleaning work as soon as possible; in any event, prior to commencement of exterior signage work.

PROTECTION:

Wall Covering: During erection, cover top of walls with strong waterproof membrane at end of each day or shutdown. Cover partially complete walls when work is not in progress. Extend cover minimum of 24 inch down both sides. Hold covers securely in place.

Load Application: Do not apply uniform floor or roof loading for at least 12 hours after building masonry columns or walls. Do not apply concentrated loads for at least 72 hours after building

masonry columns or walls.

Staining: Prevent mortar or grout from staining face of masonry left exposed or painted.

CLEANING OF PREMISES:

General: Contractor shall remove all rubbish, and building materials left over from masonry construction operation; premises must be left clear and clean when masonry work is completed; mortar dropping shall be completely removed.

* * * * *

End of Section 04 20 10

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

Note: The provisions of Section 04050 - "Unit Masonry Procedures" apply to Work under this Section.

WORK INCLUDED

General: Provide Concrete Unit Masonry as indicated and as specified herein.

RELATED WORK

General: Following items of related work are included in other sections.

- A. Reinforcement for grout fill: Section 03 20 00.
- B. Unit masonry mortar and grout: Section 04 05 13.
- C. Unit masonry anchors, reinforcement: Section 04 05 23.
- D. General unit masonry requirements: Section 04 20 10.

QUALITY ASSURANCE

Source Quality Control: Source of concrete unit masonry materials shall remain same throughout entire Project and shall not be changed except by written permission of Architect.

SUBMITTALS

General: As specified and/or indicated in other Division 4 Sections, submit to Architect all required submittals in accordance with Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Samples: Submit two full size concrete masonry units of each type, including special shapes required to show range of texture, finishes and dimensions.

Certificate: Furnish manufacturer's certification that masonry units furnished meet or exceed the requirements of this Section.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in the Project Manual, or on items which the Architect has designated as an "approved equal". A product not named in the Project Manual or that is not approved by the Architect, in accordance with FP&C procedure in 4.3 Instruction to Bidders, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY, STORAGE AND HANDLING

General: Deliver and store concrete unit masonry in accordance with Delivery, Storage and Handling requirements of Section 04 20 10 - "Unit Masonry Procedures".

PROJECT CONDITIONS

General: In accordance with Project Conditions requirements of Section 04 20 10 - "Unit Masonry Procedures".

PART TWO - PRODUCTS

CONCRETE MASONRY UNITS

General Requirements: All concrete masonry units specified herein shall meet following general requirements.

- A. Strength:
 - 1. Exterior Walls: Min. compressive strength: fm' = 1500 psi.
 - 2. Interior Walls: Min. compressive strength: fm' = 1000 psi.
- B. Aggregate: Provide lightweight aggregate units.

Hollow Non-Load Bearing Units: Provide hollow non-load bearing concrete masonry units as indicated and/or specified below:

- A. Type and Grade: ASTM C-129, Type I, for use in interior concrete unit masonry partitions as indicated.
- B. Dimensions: 3-5/8 inch by 15-5/8 inch, 7-5/8 inch by 15-5/8 inch, and 7-5/8 inch by 7-5/8 inch of thickness indicated.
- C. Corners: Provide bullnose corners for all outside corners, window sills and exposed corners; double bullnose or single bullnose as detailed for all sizes of concrete masonry units.

PART THREE - EXECUTION

INSPECTION

General: Examine areas and conditions under which Concrete Unit Masonry Work will be performed. Notify Contractor and Architect in writing of any detrimental conditions prior to installation. Do not proceed until unsatisfactory conditions have been corrected.

PREPARATION

NOTICE: Do not wet any concrete masonry prior to installation; lay only dry units.

INSTALLATION

General: Follow general requirements for laying up of masonry construction as specified in Section 04 20 10 - "Unit Masonry Procedures".

Block Bond: Running bond with vertical joints located at center of masonry units in alternate course below.

Mortar Joints:

- A. Dimensions: Nominal thickness - 3/8 inch.
- B. Block Joint Finish: Finish face joints exposed on exterior or interior with metal tool to form concave joint, close hairline cracks and crevices.
- C. Finish of All Other Joints: Cut off flush.

POINTING AND CLEANING

General: Follow requirements for Pointing and Cleaning as specified in Section 04 20 10 - "Unit Masonry Procedures".

PROTECTION

General: Follow requirements for Protection as specified in Section 04 20 10 - "Unit Masonry Procedures".

* * * * *

End of Section 04 22 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide finish carpentry and millwork as indicated on Drawings and specified herein.

Definition: Finish carpentry and millwork includes carpentry work which is exposed to view, is non-structural, and which is not specified as part of other sections. Types of finish carpentry work and millwork in this section include:

- A. Interior running and standing trim.
- B. Casework.
- C. Wood shelving.
- D. Installation of wood doors.
- E. Installation of door hardware.

RELATED WORK

- A. Rough carpentry: Section 06 10 00.
- B. Plastic laminate wainscots: Section 06 20 25
- C. Reinforced gypsum fabrications: Section 09 27 13

QUALITY ASSURANCE

Architectural Millwork Manufacturer: Experienced in this type of Work; successfully completed comparable Work.

Softwood Lumber Standards: Comply with PS-20 and with applicable grading rules of the respective grading and inspecting agency for species and product indicated.

Plywood Standard: Comply with PS-1.

Hardwood Lumber Standard: Comply with National Hardwood Lumber Association (NHLA) rules.

Hardwood Plywood Standard: Comply with PS-51.

AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

Quality Standards: For following types of finish carpentry and millwork; comply with indicated standards as applicable:

- A. Casework and Countertops: AWI Section 400.
- B. Miscellaneous Work: AWI Section 700.

Markings: Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency identifications; except omit marking from surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Submit manufacturer's specifications and installation instructions for each item of factory-fabricated woodwork and casework.

Quality Certification: Submit manufacturer's (Fabricator's) certification, stating that fabricated work complies with quality grades and other requirements indicated.

Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, attachment devices and other components. Submit shop drawings for the following:

- A. Framed openings and lights, including trim.
- B. Casework.
- C. Shelving.

SUBSTITUTIONS

General: For products specified as above, Bids shall be based on products named in Project Manual or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

PRODUCT DELIVERY, STORAGE AND HANDLING

Protection: Protect finish carpentry materials and millwork during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

Notice: Do not deliver finish carpentry materials and millwork, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in

other than installation areas, store only in areas meeting requirements specified for installation areas.

JOB CONDITIONS

Conditioning: Installer shall advise Contractor of temperature and humidity requirements for finish carpentry and millwork installation areas. Do not install finish carpentry until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

Note: Maintain temperature and humidity in installation area as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. Fabricator of woodwork shall determine optimum moisture content and required temperature and humidity conditions.

PART TWO - PRODUCTS

GENERAL MATERIALS

AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

Quality Standards: For following types of finish carpentry and millwork; comply with indicated standards as applicable:

- A. Trim: AWI Section 300.
- B. Casework and Countertops: AWI Section 400.
- C. Shelving: AWI Section 600.
- D. Miscellaneous Work: AWI Section 700.

Dimensions: Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to actual sizes and pattern as shown, unless otherwise indicated.

Millwork Manufacturer: Responsible for details, dimensions not controlled by job conditions; show on shop drawing all field measurements beyond his control. General Contractor, Woodwork Manufacturer shall cooperate to establish, maintain these field dimensions.

PLASTIC LAMINATE

PL WILSONART PLASTIC LAMINATE
COLOR – PORTICO TEAK #8210K-28 FINISH –
GLOSS LINE
(CABINET LAMINATE)

Solid Surfacing Material Countertops: Except as otherwise indicated, provide separate solid surfacing material countertops as indicated. Material shall be installed on casework or support system as indicated to comply with following:

SS WILSONART SOLID SURFACE

COLOR – DUSK ICE #9203CE (CABINET
COUNTERTOP)

FINISH FOR CASEWORK AND MILLWORK

General: Primary and pre-finishing (if any) of casework or millwork required to be performed at the shop or factory is specified as work of this section. Refer to DIVISION 9 sections for final finishing of installed woodwork.

Preparations for Finishing: Comply with AWI Quality Standards, Section 1500, for sanding, filling countersunk fasteners, back woodwork, as applicable to each unit of work.

CABINET HARDWARE AND ACCESSORY MATERIALS

General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for units which are specified as "door hardware" in DIVISION 8 sections of these specifications.

Hardware Standards: Except as otherwise indicated, comply with ANSI A 156.9 "American National Standard for Cabinet Hardware".

Quality Level: Type 2 (institutional), unless otherwise indicated.

Quality Certification: Where available, provide cabinet hardware bearing BHMA certification label, affixed either to hardware or its packaging, showing compliance with BHMA Cabinet Hardware Standard 201.

Cabinet Door Hardware: Provide hinges, catches and pulls of types indicated, to accommodate each door size and style. All cabinet doors and drawers shall be lockable. Key shall conform to design standards.

Shelf Supports: Where shelving is indicated as "adjustable", provide slotted-type standards and brackets of type needed to support shelves with uniform 40 pounds per square foot loading.

Exposed Hardware Finish: Except where not available, provide exposed hardware with BHMA Code 626 satin chromium plate finish (US26D); where not available, provide either satin aluminum or satin stainless steel finish.

PART THREE - EXECUTION

PREPARATION

General: Condition wood materials to average prevailing humidity conditions in installation areas prior to installing.

Backpriming: Backprime lumber for painted finish exposed on the exterior or, where indicated, to moisture and high relative humidities on the interior. Comply with requirements of section on painting within DIVISION 9 for primers and their application.

Casework: Prior to installation of casework and millwork, examine shop fabricated work for completion, and complete work as required, including backpriming and removal of packing.

FINISH CARPENTRY INSTALLATION

General: Discard units of material which are unsound, warped, bowed twisted, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

Tolerances: Install work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level countertops; and with 1/16 inch maximum offset in flush adjoining 1/8 inch maximum offsets in revealed adjoining surfaces.

Fitting: Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.

Anchorage: Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.

CASEWORK AND MILLWORK INSTALLATION

Casework: Install without distortion so that doors and drawers will fit openings properly and be 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.

Countertops: Anchor securely to base units and other support systems as indicated.

Wood Storage Shelving: Complete assembly of units and install in areas indicated, including hardware and accessories as indicated.

INSTALLATION OF MISCELLANEOUS ITEMS

Wood Doors: Hang all wood doors in accordance with manufacturer's recommendations; leave operating smoothly without binding or dragging. Refer to Section 0814 13 - "Wood Doors" for additional requirements for installation.

Finish Hardware: Install finish hardware furnished under DIVISION 8 sections, in accordance with manufacturer's recommendations. Finish hardware shall be properly fitted, accurately adjusted, thoroughly tested and left in completely satisfactory operating condition. Turn all keys over to Owner or Architect properly tagged and identified as directed.

ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

General: Repair damaged and defective work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

Hardware: Clean hardware, lubricate and make final adjustments for proper operation.

Wood: Clean woodwork on exposed and semi-exposed surfaces. Touch-up of shop-applied finishes to restore damaged or soiled areas.

Field Finishing: Refer to the DIVISION 9 sections for final finishing of installed architectural woodwork.

Protection: Installer of finish carpentry and millwork shall advise Contractor of procedures required to protect finish carpentry and millwork during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

* * * * *

End of Section 06 20 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide sheet metal flashing and trim as indicated on Drawings and specified herein.

Note: Materials furnished under this Section which are to be built-in by other trades shall be delivered to site in time to avoid delays to construction progress.

RELATED WORK

General: Following items of related work are included in other sections:

- A. Structural steel: Sections in Division 05
- B. Rough carpentry: Section 06 10 00
- C. Preformed standing seam roofing: Section 07 41 14
- D. Flexible wall flashing: Section 07 65 00
- E. Roof accessories: Section 07 72 00
- F. HVAC sheet metal work: Sections in Division 23

REFERENCES

General: Recommended practices as set forth by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), in "Sheet Metal Manual" are by reference made a part of this Section.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Submittals and Shop Drawings".

Product Data; Flashing, Sheet Metal, Accessories: Submit manufacturer's product specifications, installation instructions and general recommendations for each specified sheet metal material and fabricated product.

Shop Drawings; Flashing, Sheet Metal, Accessories: Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including major counter flashings, trim/fascia units, gutters, downspouts, scuppers and expansion joint systems; layouts at 1/4 inch scale, details at 3 inch scale.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named

in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

PROJECT CONDITIONS

General: Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protect of materials and finishes.

WARRANTY

Special Warranty on Finishes: On Manufacturer's standard form, in which Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

- A. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - 1. Color fading more than 10 Hunter units when tested according to ASTM D2244.
 - 2. Chalking in excess of a No. 6 rating when tested according to ASTM D 4214.
 - 3. Cracking, checking, peeling or failure of paint to adhere to bare metal.
- B. Finish Warranty Period: 20 years from date of Substantial Completion.

PART TWO - PRODUCTS

MATERIALS

General: Provide all accessories, other items essential to completeness of sheet metal installation, though not specifically indicated or specified. Unless otherwise indicated or specified, all such items shall be of same kind of material as item to which applied.

Prepainted Sheet Metal: 24 gauge hot dipped galvanized steel (G90) commercial quality, extra smooth primed and finished with Kynar 500, Hylar 5000, or approved equal based fluoropolymer coating 1.0 + 0.1 mil total dry film thickness.

- A. A wash coat of 0.3 to 0.4 mil dry film thickness shall be applied to reverse side.
- B. Prepainted finish side shall be coated with a liquid applied factory installed strippable film for protection of the finish surface during shipping, fabrication and installation.
- C. Materials shall be protected from heat and direct sunlight to prevent deterioration of strippable film prior to its removal.
- D. The color of materials shall be signed / dated by User Agency with copy sent to Architect **PRIOR** to ordering materials.

Aluminum Extrusions: Alloy and temper recommended by manufacturer for use intended and as required for proper application of finish indicated but not less than strength and durability properties specified in ASTM B-221 for 6063-T5.

Aluminum Sheets: Alloy and temper recommended by manufacturer for use intended and as required for proper application of finish indicated but not less than strength and durability properties specified in ASTM B-204 for 5005-H15.

Lead: Hard type, weighing not less than 2-1/2 pounds per square foot; Federal Specification QQ-L-201A.

Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B-32), with rosin flux.

Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.

Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.

Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, non-migrating sealant.

Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed; comply with FS TT-S-0027, TT-S-00230, or TT-S-001543.

Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by manufacturer for exterior/interior nonmoving joints including riveted joints.

Reglets: Metal or plastic units of the type and profile indicated, compatible with flashing indicated, noncorrosive.

Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.

Roofing Cement: ASTM D-2822, asphaltic.

FABRICATION

General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of work. Form work to fit substrates. Comply with material manufacturer's instructions and recommendations. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels as indicated, with exposed edges folded back to form hems.

Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with industry standards.

Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART THREE - EXECUTION

INSPECTION

General: Examine surfaces to be covered by sheet metal; notify Contractor and Architect in writing of any improper or defective surface. Do not proceed until such unsatisfactory conditions are corrected.

INSTALLATION

General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

Note: Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

Counterflashing: Install counterflashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

Reglets: Install reglets to receive counter flashing in manner and by methods indicated. Where shown in concrete, furnish reglets to trades of concrete work for installation as work of DIVISION 3 sections. Where shown in masonry, furnish reglets to trades of masonry work, for installation as work of DIVISION 4 sections.

CLEANING AND PROTECTION

General: No touch up paint of any kind will be allowed on pre-finished metal. If pre-finished metal is marred, scratched, rust from shavings, dented, etc. it must be replaced.

Cleaning: Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of Substantial Completion.

SCHEDULE OF FLASHING AND SHEET METAL

FORMED ROOF EDGE FLASHING

General: Factory painted Kynar 500, Hylar 5000, or approved 24 gauge steel; formed in 8'-0" or 10'-0" sections. Install on wood nailers, nailed at 8 inch intervals through 4 inch roof flange; lapped joints, sealed with mastic.

GUTTERS

General: Factory painted Kynar 500, Hylar 5000, or approved 24 gauge galvanized steel; formed in 8'-0" or 10'-0" sections. Lap joints 1-1/2 inches, rivet and solder. Provide outlet tubes, gutter ends as required. Provide strap supports spaced 3'-0" o.c.

DOWNSPOUTS

General: Factory painted Kynar 500, Hylar 5000, or approved 24 gauge steel; lap end joints minimum of 1-1/2 inches in direction of water flow; lock longitudinal joints. Provide elbows at bottom.

Anchorage: Held in position with 3 inch wide straps of same material as downspout, spaced maximum of 10'-0" on center, fastened securely to wall.

METAL FLASHING

Steel: 24 gauge pre-finished steel formed in 8'-0" sections; lap end joints 3 inches; do not solder joints; make continuous at angles; overlap base flashing minimum of 3 inches.

METAL COUNTERFLASHING

Steel: 24 gauge pre-finished steel formed in 8'-0" sections; lap end joints 3 inches; do not solder joints; make continuous at angles; overlap base flashing minimum of 3 inches. Extend into masonry walls at least 3 inches. In raked joints or reglets fasten with lead wedges every 12 inches. Fill reglets on vertical surfaces with one-compound polysulfide or silicone based sealant compound of color matching adjacent work.

* * * * *

End of Section 07 60 00

GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide hollow metal doors and frames as indicated on Drawings and specified herein.

RELATED WORK

General: Following items of related work are included in other sections:

- A. Installation of hollow metal frames in masonry: Section 04 20 10
- B. Wood doors: Section 08 14 00
- C. Door hardware: Section 08 71 00
- D. Field painting: Section 09 90 90
- F. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

QUALITY ASSURANCE

Standards: Provide doors and frames complying with Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (S.D.I.-100) and as herein specified.

Manufacturer: Provide standard steel doors and frames by a single firm specializing in production of this type work.

Fire-Rated Assemblies: Provide fire-rated doors and frames as indicated that have been investigated and tested as a fire door assemblies, complete with hardware to be used. Identify each fire door with recognized testing laboratory labels, indicating applicable fire rating of doors and frame. Construct and install assemblies to comply with N.F.P.A. Standard No. 80, and as herein specified.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples"

Product Data: Submit manufacturer's specifications for fabrication and installation, including data substantiating that products comply with requirements.

Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items. Provide schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY, STORAGE AND HANDLING

Delivery: Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.

Inspections: Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to Architect; otherwise, remove and replace damaged items as directed without additional cost to Owner.

Storage: Store doors and frames at Project site under cover. Place units on wood sills at least 4 inches high, or otherwise store on floors in manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4 inch spaces between stacked doors to promote air circulation.

PART TWO - PRODUCTS

ACCEPTABLE MANUFACTURERS

General: Provide steel frames by one of following: Curries, Amweld Building Products Division; Ceco Corporation; Fenestra; SteelCraft Manufacturing Company; or approved equal.

MATERIALS

Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A-569 and ASTM A-568.

Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A-366 and ASTM A-568.

Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A-526, with ASTM A-525, G60 zinc coating, mill phosphatized.

Supports and Anchors: Fabricate of not less than 18 gauge galvanized sheet steel.

Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A-153, Class C or D as applicable.

Shop Applied Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

STANDARD STEEL FRAMES

General: Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated.

Interior Frames: Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option); 16 gauge unless indicated otherwise.

Fabrication: Fabricate frames with mitered corners, welded construction.

Door Silencers: Except on weatherstripped frames, drill stops to receive three silencers on strike jambs of single-swing frames and two silencers on heads of double-swing frames.

Mullions, Transom Bars: Closed or tubular construction; member with heads, jambs, secured thereto with butt welded joints. Provide adjustable floor anchors, spreader connections at bottom of mullions.

Glazing Beads: 18 gauge metal. Drill; tap frames to receive type of glazing beads, stops required. Secure beads to frames with oval head, counter sunk machine screws, spaced approximately 9 inches on centers.

Plaster Guards: Provide 26 gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation.

FABRICATION

General: Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site.

Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

Finish Hardware Preparation: Prepare doors and frames to receive finish hardware in accordance with final Finish Hardware Schedule (see Section 08 71 00) and templates provided by hardware supplier. Comply with applicable requirements of ANSI A-115 series specifications for door and frame preparation for hardware.

Hardware: Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at Project site. Locate hardware in connection with hinged or other swing type doors and frames as follows unless indicated or specified otherwise:

- A. Locks, Panic Devices, Latches: 40-5/16 inches from finish floor to center of strike.
- B. Deadlocks with Separate Latchset or Pull: 52 inches from finish floor to center line of strike.
- C. Top Hinge: To manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
- D. Bottom Hinge: To manufacturer's standard, but not greater than 12-1/2 inches from finish floor to center line of hinge.

- E. Intermediate Hinge: Equally spaced between top and bottom hinge.
- F. Door Pulls: 40-5/16 inches from finish floor to center of grip.
- G. Push Plates: 45 inches from finish floor to center of plate.

Shop Painting: Clean, treat, and paint exposed surfaces of steel doors and frame units, including galvanized surfaces. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

PART THREE - EXECUTION

INSPECTION

General: Installer must examine substrate and conditions under which steel doors and frames are to be installed and must notify Contractor and Architect in writing of any conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

INSTALLATION

General: Install standard steel doors and frames, and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

Placing Frames: Comply with provisions of S.D.I.-105, "Recommended Erection Instructions for Steel Frames", unless otherwise indicated.

Note: Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

- A. In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels. Building-in of anchors and grouting of frames is specified in DIVISION 4.
- B. At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.
- C. Install fire-rated frames in accordance with NFPA Standard No. 80.
- D. In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach wall anchors to studs with tapping screws.

ADJUSTMENT AND CLEANING

Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

Final Adjustments: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

* * * * *

End of Section 08 11 13

ONE – GENERAL**RELATED DOCUMENT**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide wood doors as indicated on Drawings and specified herein.

Types: Doors required include following:

- A. Solid core flush wood doors with veneer faces.

RELATED WORK

General: Following items of related work are included in other sections:

- A. Finish Carpentry and Millwork: Section 06 20 00
- B. Hollow metal frames: Section 08 11 13
- C. Finish hardware: Section 08 71 00
- E. Field painting and finishing: Section 09 90 90

QUALITY ASSURANCE

Manufacturer: Obtain doors from a single manufacturer to ensure uniformity in quality of appearance and construction, unless otherwise indicated.

Tolerances: Tolerances for Warp, Telegraphing, Squareness and Prefitting Dimensions: WDMA I.S1.A.

Identifying Label: Each door shall bear identifying label indicating the following:

- A. Door manufacturer.
- B. Order number.
- C. Door number.
- D. Fire rating, if applicable.

REFERENCES

General: Comply with the applicable requirements of following standards unless otherwise indicated:

- A. ANSI/NWMA I.S. 1, "Industry Standard for Wood Flush Doors" published by National Woodwork Manufacturers Association (NWMA).
- B. ANSI A208.1 – Particleboard.
- C. ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne Sound

Transmission Loss of Building Partitions and Elements.

- D. ASTM E 413 – Classification for Rating Sound Insulation.
- E. AWI/AWMAC/WI – Architectural Woodwork Standards, Section 9 – Doors.
- F. AWI Quality Standard: Section 1300 of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI). Designations for grade and core construction under types of doors refer to this standard.
- G. NEMA LD3 – High Pressure Decorative Laminates.
- H. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
- I. UBC 7-2-1997/UL 10C – Positive Pressure Fire Tests of Door Assemblies.
- J. WDMA I.S.1-A – Architectural Wood Flush Doors.
- K. WDMA I.S.10 – Industry Standard for Testing Cellulosic Composite Materials for Use in Fenestration Products.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Submit door manufacturer's product data, including door construction description and WDMA I.S.1-A and AWS classifications, specifications and installation instructions for each type of wood door.

Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extend of hardware blocking, fire ratings, and other pertinent data. Reference individual door numbers as indicated on the Drawings.

Samples: Submit manufacturer's door finish samples showing range of color variation.

Test Reports: Submit manufacturer's test results of STC ratings from testing performed by independent testing agency for sound-retardant doors.

Manufacturer's Certification: Submit manufacturer's certification that doors comply with specified requirements and are suitable for intended application.

Cleaning Instructions: Submit manufacturer's cleaning instructions for doors.

Warranty: Submit manufacturer's standard warranty.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this
TLJR

Project.

DELIVERY, STORAGE AND HANDLING

General: Deliver doors to site in manufacturer's original, unopened containers and packaging with labels clearly identifying product name and manufacturer. Package doors individually in polybags.

Storage:

- A. Store doors in accordance with manufacturer's instructions.
- B. Store doors in clean, well ventilated, dry area indoors, protected from damage and direct sunlight.
- C. Store doors flat on level surface.
- D. Do not store doors directly on concrete.
- E. Keep doors completely covered. Use covering which allows air circulation and does not permit light to penetrate.
- F. Store doors between 50 and 90degrees F (10 and 32 degrees C) and 25 to 55 percent relative humidity.

Handling:

- A. Handle doors in accordance with manufacturer's instructions.
- B. Protect doors and finish during handling and installation to prevent damage.
- C. Handle doors with clean hands or clean gloves.
- D. Lift and carry doors. Do not drag doors across other doors or surfaces.

ENVIRONMENTAL REQUIREMENTS

Conditions: Do not subject doors to extreme conditions or changes in temperature or relative humidity in accordance with WEMA I.S.1-A.

WARRANTY

Specific Product Warranty: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show telegraphing of core construction below in face veneers, or do not conform to tolerance limitations of NWMA and AWI.

Warranty: Warrant solid core, interior doors for life of installation against warpage, delamination and defects in materials and workmanship.

Corrective Work: Defects noted during warranty period shall be corrected at no cost to Owner. Corrective work shall include labor and material for repair, replacement, refinishing and rehanging as required.

PART TWO - PRODUCTS

ACCEPTABLE MANUFACTURERS

Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in Project include, but are not limited to:

- A. VT Industries, Inc. 1000 Industrial Park, P.O. Box 490, Holstein, Iowa 51025; Toll Free 800-827-1615; Phone 712-368-4381; Fax 712-368-4111; www.vtindustries.com ; door_info@vtindustries.com .

- B. Marshfield Door Systems, 1401 East Fourth Street, Marshfield, WI 54449-7780; Phone 800-869-3667; Direct Line 715-384-2141; www.marshfelddoors.com .
- C. Oshkosh Door Company, 2850 Universal Street, Oshkosh, WI 54903; Phone 920-233-6161; Fax 920-233-5022; www.oshkoshdoor.com ; info@oshkoshdoor.com .
- D. Or approved equal.

ACCEPTABLE PRODUCTS

Vision Panels:

- A. VT Industries steel vision frame.
- B. Style: No. 107.

Glazing: As specified in Section 08 80 00.

FLUSH NON-RATED SOLID-CORE PAINT GRADE DOORS:

Construction:

- A. Compliance: WDMA 1.S 1-A.
 - 1. Aesthetic Grade: Premium.
 - 2. Duty Level: Standard duty
 - 3. Type: SCLC-3
- B. Construction: Seven-ply and non-bonded core construction is not acceptable.
- C. Door Thickness: 1 3/4 inch.
- D. Stiles:
 - 1. 1 3/8 inches wide, before prefitting.
 - 2. Structural Composite Lumber (SCL).
- E. Rails:
 - 1. Structural composite lumber (SCL).
 - 2. Minimum Width before prefitting: 1 3/8 inches.
- F. Core:
 - 1. Material: Structural composite lumber (SCL).
 - 2. Structural Composite Lumber Core Compliance: WDMA I.S. 10.
 - 3. Composite Crossband:
 - a. Apply to core in hot press using TypeI, exterior, water-resistant adhesive.
 - b. Exposed Crossbanding: Not allowed along stile edges.
- G. Door Assembly:
 - 1. Stiles and rails bonded to core.
 - 2. Monolithically sand core assembly to ensure minimum telegraphing of core components.
- H. Surface Material:
 - 1. Tempered Hardboard

PART THREE - EXECUTION

EXAMINATION

General: Installation of wood doors is included in Section 06 20 00 - "Finish Carpentry and Millwork".

Preparation: Allow doors to become acclimated to building temperature and relative humidity for a minimum of 24 hours before installation.

Clearance: For non-rated doors provide 3/32 inches clearance at head and jambs; 3/32 inch at meeting stiles for pairs of doors; and 3/8 inch from bottom of door to top of floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch clearance from bottom of door to top of threshold.

Trim Method: Fit for width by planing; for height, sawing, taking not over 1/2 inch from bottom first, then not over 1/2 inch from top.

Bevels: Bevel lock and hinge edges 1/8 inch in 2 inches.

Note: Do not install wood doors in improperly installed frames.

ADJUSTING

Adjustments: Adjust doors to swing freely, without binding in frame. Adjust hardware to operate properly.

Repair: Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

Remove: Remove and replace damaged doors that cannot be successfully repaired, as determined by Architect.

CLEANING

Clean: Clean doors promptly after installation in accordance with manufacturer's instructions. Do not use harsh cleaning materials or methods that could damage finish.

PROTECTION

Protect: Protect installed doors from damage during construction.

* * * * *

End of Section 08 14 00

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Hardware for swinging, sliding, and folding doors except special types of unique and non-matching hardware specified in other sections.

1.02 RELATED WORK

- A. Section 08 21 00 - Flush Wood Doors

1.03 REFERENCES

- A. ADA - Americans with Disabilities Act of 1990 including Accessibility Guidelines as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).
- B. ANSI A117.1 - Buildings and Facilities - Providing Accessibility and Usability for Physically Handicapped People.
- C. ANSI/BHMA A156 (.1 through .21)
- D. ANSI/DHI – A115.1G Installation Guide for Doors and Hardware.
- E. FEMA P-361 – Safe Rooms for Tornadoes and Hurricanes.
- F. NFPA 80 - Fire Doors and Windows.
- G. NFPA 101 – Life Safety Code
- H. IBC - International Building Code, as adopted by public Authority Having Jurisdiction (AHJ).
- I. State and local Rules and Regulations for Barrier Free Facilities, as adopted by AHJ.

1.04 DOOR HARDWARE TYPES

- A. Types of finish hardware required include, but is not necessarily limited to, the following:
 - 2. Hinges.
 - 3. Lock cylinders.
 - 4. Keys, keying, and key control.
 - 5. Locksets, latchsets, and privacy sets.
 - 6. Exit devices.
 - 7. Closers.
 - 8. Mullions.
 - 9. Overhead, wall, and floor stops.
 - 10. Protection plates.
 - 11. Gasketing for exterior and interior doors, as required.
 - 14. Thresholds.
 - 15. Silencers.
- B. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware is indicated elsewhere in this section or in the Door Hardware Schedule at the end of this section. Refer to Part 2 Products for Manufacturer's identification and allowable substitutions.

1.05 SUBMITTALS

- A. Under provisions of Section 01 34 00, submit the following:

1. Product information: Manufacturer's published technical product data for all specified door hardware items indicating compliance with the requirements.
 2. Hardware Schedule:
 - a. Hardware schedules are intended for the Contractor's coordination of the work. Review and acceptance by the Architect or Owner will not relieve the Contractor of his exclusive responsibility to fulfill the requirements as shown and specified.
 - b. Submit hardware schedule in the manner and format as specified, complying with the actual construction progress schedule requirements for each draft. Include the following information:
 - 1) Explanation of all abbreviations, symbols, codes, at the like, including door handing.
 - 2) Type, style, function, size, and finish of each hardware item.
 - 3) Door and frame sizes and materials cross referenced to the Architect's marks in the door schedule.
 - 4) Room identification (name and number) on each side of door opening as indicated on the drawings.
 - 5) Product name, model number, description, and name of manufacturer of each item.
 - 6) Fastenings and other pertinent information.
 - 7) Locations of hardware cross referenced to architectural floor plans and door schedules.
 - 8) Mounting heights and locations of each type of hardware.
 3. Key Schedule:
 - a. Require qualified representative of the hardware supplier to personally meet with the Owner and obtain the Owner's written key requirements.
 - b. Include a separate key schedule, showing clearly how the Owner's instructions on keying of locks has been fulfilled.
 4. Samples: Upon request, submit actual material samples of items indicated as for color selection.
 5. Templates: Hardware supplier will furnish hardware templates to the Contractor for each fabricator of doors, frames, and other work to be shop prepared or factory prepared for the installation of hardware. Upon request check shop drawings of such other work, to conform that adequate provisions are made for proper location and installation of hardware.
 6. Provide electrical operation technical sheets including product schematics, point to point diagrams, and electrical requirements of all electrified hardware. Completely coordinate with the general contractor, electrical engineer, electrician, security access subcontractor and the installer. Operational descriptions are for demonstration only – verify operational intent with the owner, architect, and electrical engineer.
- B. Under provisions of Section 01 70 00, submit the following:
1. Product information.
 2. Hardware schedule.
 3. Manufacturer's published operation and maintenance data. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
 4. Tools and extra materials as required.
 5. Manufacturer's warranties revised to meet criteria as established within this section. Warranties shall commence upon acceptance of the building by the owner.
 6. Provide physical samples as requested in writing.

1.06 QUALITY ASSURANCE

- A. Acceptable Designs:
1. Items specified in this section are products which are of acceptable design.
 2. Do not substitute other products without Architect's written prior approval per Section 01600. Requests for approval shall be submitted by factory authorized distributor firms

representing the products proposed for substitution.

B. Qualifications:

1. Manufacturer: Manufacturers named in Part 2 of this section with not less than 5 years' experience in manufacturing commercial door hardware of the type indicated.
2. Hardware Supplier:
 - a. A recognized architectural finish hardware supplier who has been furnishing hardware in the same state as the project for a period of not less than 5 years.
 - b. Hardware supplier's organization shall include an experienced Architectural Hardware Consultant (AHC), certified by the Door and Hardware Institute (DHI), who is physically available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor. Mail or telephone correspondence is not acceptable.
 - c. Hardware supplier shall have local warehousing facilities and shall maintain an adequate parts inventory of items supplied for future service to the owner. Supplier will be a factory authorized distributor of all hardware specified.
3. Installer: Company specializing in installing work of this section with not less than 3 years' experience and acceptable to the manufacturer and the hardware supplier. Maintain regular work force of qualified personnel, trained, skilled, and experienced in installing door hardware and constant, competent supervision. The hardware installer shall meet with the representatives of the general contractor and hardware supplier to jointly inventory all hardware items. Upon satisfactory inventory of products, the hardware installer accepts responsibility for all hardware items inventoried.

C. Regulatory Requirements:

1. Provide hardware for fire rated openings, whether specified or not, in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels. Label hardware, as required, for compliance with pressure testing criteria as dictated in IBC.
2. Provide hardware which meets or exceeds handicap accessibility per local building code requirements. Conform to the Americans with Disabilities Act (ADA) of 1990 as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).
3. If applicable, meet all requirements as directed by the D.O.H. (Department of Health).
4. This is a secure facility with controlled access and egress.

D. Warranties:

1. Provide warranty periods that meet or exceed periods noted. Manufacturers that do not meet the required warranty periods shall supply a written statement on the manufacturer's letterhead that the products will be warranted for the required period. All warranty periods commence upon the date of Owner's occupancy with no exceptions.

1.07 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A.** Deliver, store, handle, and protect products to project site under provisions of Section 01 60 00 and as specified herein.
- B.** Require hardware supplier to:
1. Tag each item or package separately, with identification related to final hardware schedule.
 2. Include manufacturer's basic installation instructions with each item or package.
 3. As material is received by hardware supplier from various manufacturers, sort and repackage in containers with each item clearly marked with appropriate opening numbers to match the approved hardware schedule. Two or more identical items may be packed in the same container.

4. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
 5. Inventory hardware jointly with representatives of the general contractor, hardware supplier and the hardware installer until each is satisfied that count is correct. Refer to paragraph 1.6-B-3.
- C. Protect hardware from theft by cataloging and storing in a secure and lockable area. Control the handling and installation of hardware items which are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses, both before and after installation. Replace lost, missing, damaged, or stolen door hardware items at no additional cost to the Owner as required to meet schedule requirements.

1.08 SEQUENCING AND SCHEDULING

- A. Coordinate work of this section with the work of other sections of work.
- B. Furnish hardware templates to each fabricator of doors, frames, and other work to be shop or factory prepared for the installation of hardware.
- C. Verify completeness and suitability of door hardware with the hardware supplier and the hardware installer.

1.09 MAINTENANCE MATERIALS

- A. Furnish to Owner a complete set of special wrenches and tools applicable to each different or special hardware component as needed for Owner's continued adjustment, maintenance, removal, and replacement of door hardware.
- B. Tools and accessories shall be supplied by the hardware component manufacturer.

PART 2 – PRODUCTS

2.01 MATERIALS AND FABRICATION

- A. General:
 1. Provide all door hardware for complete work, in accordance with the drawings and as specified herein.
 2. Quantities listed, in any instance, are for the Contractor's convenience only and are not guaranteed.
 3. Provide items and quantities not specifically mentioned to ensure a proper and complete operational installation. Match the quality and finish of items specified.
 4. Provide miscellaneous hardware as listed in hardware groups.
- B. Hand of door: Drawings show direction of slide, swing, or hand of each door leaf. Door schedule indicates door and frame sizes, materials, required fire ratings, and other pertinent information. Furnish each item of hardware for proper installation and operation of door movement as indicated.
- C. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable name plates), except in conjunction with required UL or FM labels and as otherwise acceptable to the Architect. Manufacturer's identification will be permitted on rim of lock cylinders and latch faceplates only.
- D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as

otherwise specified.

- E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
 - 1. Screws: Furnish screws for installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finishes of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
 - 2. Concealed Fasteners: Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

2.02 HINGES

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Stanley
 - 2. Substitutions: Hager
 - 3. Continuous hinges are as manufactured by Stanley. Equal products by Hager and ABH are acceptable.
- B. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template produced units.
- C. Screws: Furnish Phillips flat head or machine screws for installation of units, except furnish Phillips flat head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges.
- D. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - 1. Steel Hinges: Steel pins.
 - 2. Non-ferrous Hinges: Stainless steel pins.
 - 3. Exterior doors: Non-removable pins.
 - 4. Reverse bevel interior doors (lockable): Non-removable pins.
 - 5. Interior doors: Non-rising pins.
- E. Pin Tips: Flat button and matching plug, finished to match leaves.
- F. Number of Hinges: Provide number of hinges indicated, but not less than 3 hinges per door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.
- G. Butt type hinges are to be warranted for a period of five years.

2.03 LOCK CYLINDERS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Best Cormax Patented
- B. All lock cylinders shall be equipped with 7-pin tumbler small format interchangeable core lock cylinders. The interchangeable core shall be removable by a special control key. The control key shall have no cuts in common with grandmaster keys which operate with a shear line completely independent from the shear line of the grandmaster, master, and operating keys. All cores shall have a special limited keyway and shall be removable without removing the cylinder, knob, or core housing of any type lock or lockset. The removable core shall be instantly interchangeable without modification for use in any lock throughout the system. Provide brass

construction cores for the construction period. Plastic construction cores are not acceptable. Construction cores shall remain the property of the hardware supplier and will be returned upon incorporation of the permanent key system.

- C. Construct lock cylinder parts from brass/bronze, stainless steel, or nickel silver.

2.04 KEYS, KEYING, AND KEY CONTROL

A. Keys:

1. Material: Provide keys of nickel silver only.
2. Quantities: These quantities are to establish a maximum allowable quantity of cut keys to service the project and may not necessarily be assigned as noted. A lesser quantity of cut keys required will not result in any credits, nor a quantity of uncut keys to be issued unless noted otherwise.
 - a. 3 change keys per each cylinder unit.
 - b. 4 master keys per master.
 - c. 2 grandmaster keys.
 - d. 1 construction control key.
 - e. 2 permanent control keys.
 - f. 10 construction keys.
3. Deliver keys to the Owner's representative: Send masterkeys to the Owner via U.S. registered mail direct from hardware supplier or manufacturer.

B. Keying:

1. Comply with Owner's written instructions for masterkeying and, except as otherwise indicated, provide individual change keys for each lock which is not designated to be keyed alike with a group of related locks.
2. Grandmaster key all cylinder items to coordinate with the Owner's instructions and the Best Cormax patented key system. Allow for expansion. Permanently inscribe each key with the notation "DO NOT DUPLICATE".

C. Key Control:

1. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by the system manufacturer, with capacity for 150% of the number of locks required for the project.
2. Provide a hinged panel type cabinet, for wall mounting, Telkee AWC-150S or equal.
3. Provide cylinder units with concealed key control and keys with visual key control.

2.05 LOCKSETS, LATCHSETS, AND PRIVACY SETS:

A. Manufacturer:

1. Listed in Door Hardware Schedule: Best

B. Types: Locksets, latchsets, and privacy sets as indicated in Door Hardware Schedule.

- ### **C. Strikes:** Provide manufacturer's standard wrought box strike for each latch or lock bolt. Provide dust-proof strikes for foot bolts, except where not available. At these locations, provide manufacturer's standard recessed strike. Provide roller type strikes where recommended by lock, latch, or bolt manufacturer. If aluminum frames are specified, confirm with the aluminum frame supplier that the standard lock strikes will function. Provide the manufacturer's standard extended lip strikes if required.

- ### **D. Lock Throw:** Provide minimum 5/8" throw of cylindrical type latches. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

- ### **E. Locks and latches shall be warranted for a period of five years.**

2.06 EXIT DEVICES AND MULLIONS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Accentra Assa Abloy
- B. Provide risers, as needed, to prevent interference with door glazing kits.
- C. Provide spacers as needed for proper application of removable mullions on narrow stop type frames.
- D. Exit devices and related hardware shall be warranted for a period of five years.

2.07 CLOSERS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Stanley QDC100 Series
 - 2. Substitutions: Dorma 8600/8900 Series
 - 3. Concealed double acting closers are as manufactured by Dorma if required in Patient Restrooms.
- B. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending on the size of the door, exposure to weather and anticipated frequency of use.
- C. Provide manufacturer's standard through bolt attachment at all applications.
- D. Arms:
 - 1. Provide parallel arms for all overhead closers, except as otherwise indicated. Provide drop plates as needed to prevent glazing interference.
- E. Mount all closers to the maximum allowable degree of opening by the closer manufacturer's template. Where closer arms incorporate dead stop features, mount closers to the maximum degree of opening available before conflict with adjacent structures. If not apparent on the contract documents, verify the use of open space with the Architect or Owner's Representative to determine the maximum allowable degree of opening.
- F. Access Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provision for door opening force. Fire protection has precedence over handicap compatibility, check with local jurisdiction.
- G. Door closers and related hardware shall be warranted for a period of ten years.

2.09 WALL AND FLOOR STOPS

- A. Manufacturers:
 - 1. Listed in Door Hardware Schedule: Rockwood
 - 2. Substitutions: Hager
- B. General: Except as otherwise indicated, provide stops (wall, floor or overhead) at each leaf of every swinging door leaf.
- C. Import products lesser in quality than the specified items are not acceptable.

2.10 PROTECTION PLATES

- A. Manufacturers:
 - 1. Listed in Door Hardware Schedule: Rockwood
 - 2. Substitutions: Hager
- B. Types: Armor Plates, Kick Plates, Mop Plates
- C. Fasteners: Provide manufacturer's standard exposed Phillips head fasteners for door trim units; either machine screws or self-tapping sheet metal type screws per manufacturer's recommendations for

- application to the specified door construction.
- D. Sizes: Fabricate protection plates (armor, kick, or mop) not more than 2" less than door width on stop side and not more than 1" less than door width on pull side, x the height indicated.
 - F. Plastic laminate plates: 1/8" P-lam finish per the manufacturer's color selection including custom colors (CAS), beveled four edges (B4E).

2.11 GASKETS AND SWEEPS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Zero
 - 2. Substitutions: Hager
- B. General: Except as otherwise indicated, provide continuous weatherstripping at each edge of every exterior door leaf. Provide type, sizes and profiles indicated as drawn or scheduled.
- C. Fasteners: Provide non-corrosive fasteners as recommended by the manufacturer for applications indicated.
- D. Replaceable seal strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by the manufacturer.
- E. Perimeter weatherstripping: Flexible, hollow neoprene bulb or loop insert, conforming to MIL R 6055, Class II, Grade 40. Where two types of perimeter gaskets are specified, apply them not to conflict and per gasket manufacturer's recommendations.
- F. Weatherstripping at Door Bottoms: Provide door bottoms consisting of contact type resilient insert and metal housing of design and size indicated.
- G. Hot smoke seal, if required by IBC and subsequent UL testing procedures, will be supplied as an integral part of the door assembly by the door manufacturer.
- H. Gaskets and sweeps shall be warranted for a period of three years.

2.12 THRESHOLDS

- A. Manufacturer:
 - 1. Listed in Door Hardware Schedule: Zero
 - 2. Substitutions: Hager,
- B. Except as otherwise indicated provide standard metal threshold unit of type, size, and profile as detailed or scheduled.
- C. Where there is conflict between scheduled thresholds and details, details shall have precedence. Revise details only if necessary, to comply with handicap accessibility requirements. Notify the Architect of such required modifications.
- D. Verify threshold details or conditions at all openings to ensure that the openings receive proper applications for weather seal or floor transition whether specified or not.
- E. Thresholds and related items shall be warranted for a period of three years, abrasive coatings shall be warranted for a period of ten years.

2.13 SILENCERS

- A. Manufacturers:
 - 1. Listed in Door Hardware Schedule: Trimco
 - 2. Substitutions: Rockwood, Ives

2.14 FINISHES

- A. Exposed surfaces on Exterior Hardware shall be Satin Chrome (US26D, 626), and exposed surfaces on Interior Hardware shall be Satin Chrome (US26D, 626), unless otherwise indicated unless otherwise indicated. Items specified in Satin Stainless Steel (US32D, 630) shall be supplied in

stainless steel with no exceptions. Verify finish selection with Architect prior to ordering hardware,

- B. The designations used in the schedule and elsewhere to indicate hardware finishes are the industry recognized standard commercial finishes common to the product's manufacturer listed.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine and verify that substrates and project site conditions are ready to receive work of this section.
- B. Do not begin installation until finishes indicated to be field applied have been applied to doors, frames, and similar items requiring project site finishing and are thoroughly dry and cured.
- C. Do not begin installation until unsatisfactory conditions are corrected in a manner acceptable to the installer. Beginning installation means installer accepts project site conditions and substrates as ready to receive work of this section.

3.02 INSTALLATION

- A. General: The types and approximate quantities of door hardware required for this project are indicated at the end of this section.
- B. Heights: Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by the Architect.
- C. Substrates: Adjust and reinforce attachment substrates as necessary for proper installation and operation of hardware.
- D. Installation:
 - 1. Install each hardware item in compliance with the manufacturer's instructions, as adopted by local jurisdiction, requirements of NFPA 80, NFPA 101, IBC, ADA, State and local Rules and Regulations for Barrier Free Facilities and recommendations of the DHI.
 - 2. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - 3. Drill and countersink units which are not factory prepared for fasteners. Space fasteners and anchors in accordance with industry standards.
 - 4. All hardware is to either have non-accessible mounting components or utilize the manufacturer's standard security head fasteners. Where manufacturers do not offer a security head attachment, acquire security screws, and replace the manufacturer's standard screws. All hardware for this project is to be installed with security head screws.
 - 5. Install key cabinet as directed.
 - 6. Where not factory machined, machine cut for hardware per template, as required.
 - 7. Cut and fit thresholds and floor covers to profile of door frames. Join units with concealed welds. Cut smooth openings for spindles, bolts, or similar items. Screw thresholds to substrate with the manufacturer's standard security flat head stainless steel machine screws, 1/4-20 x lead anchors unless noted otherwise. Fill cavities of thresholds at sound rated openings with 1 inch thick (uncompressed thickness) low density fiberglass sill sealer insulation full width and length of the threshold. In addition to fastening requirements, set thresholds for exterior doors in a full bed of butyl-rubber or polyisobutylene mastic sealant.
 - 8. Do not install hardware which is incomplete or apparently improper for application. Notify the hardware supplier immediately of any such deficiencies. Failure to comply with this requirement indicates the hardware installer's acceptance of responsibility for proper application and performance.

- E. Cutting and Patching:
Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections.
- F. Where electronics are specified for integration with the security access system, operation notes are for opening options that may or may not be utilized by the owner. Consult with the owner and security access subcontractor for final operation parameters.

3.03 ADJUSTING

- A. Initial Adjustment:
 - 1. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Adjust resilient faced sound stops for continuous contact with door and threshold. Adjust weatherstripping and sweeps to completely seal doors with frames and to adjacent structures.
 - 2. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.04 DEMONSTRATION

- A. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.05 CLEANING AND DEBRIS

- A. Cleaning:
 - 1. Clean work upon installation.
 - 2. Clean adjacent surfaces soiled by work of this section.
- B. Debris: Remove debris from project site and legally dispose of off-site.

3.06 MAINTENANCE

- A. Approximately six months after the acceptance of hardware in each area, the hardware installer shall:
 - 1. Return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.
 - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
 - 3. Replace hardware items which have deteriorated or failed due to faulty design, materials, or installation of hardware units.
 - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware and submit to the Architect.

3.07 PROTECTION

- A. Protect work of this section as required so that work will be without damage or deterioration at the time of completion and acceptance by the Owner.

3.08 DOOR HARDWARE SCHEDULE:

List of Manufacturers

NA	National Guard	Weatherstrip, Thresholds
AA	Assa Abloy-Accentra	Exit Devices
BS	Best	Cylinders, Locksets
ST	Stanley	Hinges, Closers, Key Removeable Mullion
TR	Trimco	Stops, Flat Goods
ZO	Zero	Weatherstripping, Seals and Thresholds
PL	Prime-Line	Door Hole Cover

Finish Codes

<u>Code</u>	<u>Description</u>
626, 652	Brushed Chrome
630	Satin Stainless Steel
689	Painted Aluminum
BLK	Black
GREY	Grey

Option List

<u>Code</u>	<u>Description</u>
CD	Cylinder Dogging (Precision)
N Mounting	Spanner Through Bolt Mounting
(Trimco) L Mounting	Spanner Back to Back
Mounting (Trimco)	
B4E	Beveled 4 Edges – Armor, Kick and Mop Plates (Trimco)
CS	Counter Sinking of Armor, Kick and Mop Plates (Trimco)
MS/EA	Machine Screws/Expansion Anchors (NGP)
SMS-TEKS	Self-Drilling Machine Screws (NGP)

Hardware List

HW SET #1 – Existing Exit Door 3'-0" x 7'-0"

Doors: 101A, 106A

1Exit Device 6100ED(F)-36 X AU626F	630	AA
1Rim Cylinder – Mullion 12E-72 STD RP3	626	BE

HW SET #2 Office Door – Wood – 3'-0" x 7'-0"

Doors: 107A

6 Hinges K FBB168 4 1/2 X 4 1/2 NRP	US26D	ST
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COMMERCIAL DOOR OPERATORS

1 Lockset 9K37UA-15-D-S3	630	BS
1Door Closer D-3550	689	TEST
1Floor Stop 480	626	RK
1 Silencer SR64 GREY		IVES

HW SET #3 – Existing HM Classroom Door 3'-0" x 7'-0"
Doors: 103A

1 Lockset 9K37R-15-D-S3	630	BS
1 Hole Cover Plate U 10677	630	PL

HW SET #4 - Classroom Door - HM Pair 6'-0" x 7'-0"
Doors: 103B

1 Lockset 9K37R-15-D	630	BS
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HW SET #5 - Storage Room Door – Single 3'-0" x 7'-0"
Doors: 101A, 102A, 104A, 105A

1 Lockset 9K37R-15-D-S3	630	BS
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DIVISION 08

SECTION 08 71 23 – COMMERCIAL DOOR OPENERS

PART 1 GENERAL

1.1 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Manufacturer's descriptive data and product attributes.
- B. Closeout Submittals:
 - 1. Operation and Maintenance Data.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: Firm specializing in work of this Section, with minimum 10 years' experience.

1.3 WARRANTY

- A. Manufacturer's 2-year warranty against material and manufacturing defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Contract Documents are based on products by LiftMaster.
- B. Substitutions: Approved Equal

2.2 MANUFACTURED UNITS

- A. Door Operators:
1. Model: LJ8900W.
 2. Operation: Jackshaft.
 3. Mounting: Wall.
 4. Rated duty cycle: Maximum 10 cycles per hour and 25 cycles per day.
 5. Meet UL 325.
 6. Motor: 12 VDC, prewired, listed by Underwriters Laboratories, sized to door conditions.
 7. Enclosure: NEMA 1.
 8. Radio receiver: Security + 2.0 on-board; accept Security+ 2.0 rolling code technology remote controls and binary DIP switch remote controls.
 9. Internet connectivity: 50 channel FHSS myQ technology.
 10. Control station: Three push button type.
 11. Remote controls: One button DIP
 12. Primary monitored entrapment protection: Photo eyes.
 13. Secondary non-monitored entrapment protection: Photo eyes.
 14. Cable tension monitor: Reverse door if excess cable slack is detected.
 15. Automatic power door lock.
 16. Battery backup system.
 17. Alternate mounting kit.
 18. Install Automatic Garage Door Lock Model #841LM

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 CLOSEOUT ACTIVITIES

- A. Test and adjust operators for proper operation.
- B. Demonstration: Demonstrate operation and programming of operators to Owner.

* * * * *

End of Section 09 51 00

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide acoustical ceilings as indicated on Drawings and specified herein.

RELATED WORK

General: Following related requirements are included in other sections:

- A. None

QUALITY ASSURANCE

Installer: Firm with not less than three years of successful experience in installation of acoustical ceilings similar to requirements for this Project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.

Coordination: Coordinate work with mechanical, electrical, and sprinkler installers for location of lights, grilles, sprinkler heads. It is intention of Drawings and specifications that all ceiling outlets shall fit grid module and be symmetrical to this grid.

FM Compliance: Class I.

UL-Rated Assemblies: Where acoustical ceilings are components of floor, roof or beam assemblies indicated for fire-resistance rating, including those required for compliance with governing regulations, provide acoustical materials and application or suspension bearing UL Classification Marking for applicable UL design number listed in UL "Fire Resistance Index". Where required by applicable UL design, provide protection materials for fixtures and ducts.

UL Fire Hazard Classification: Where acoustical ceilings are indicated to comply with fire hazard classification for flame spread, and including fuel contribution and smoke development classifications where indicated, provide acoustical materials which have been tested, rated and labeled by UL for indicated ratings as listed in "Classified Building Materials Index" by UL.

- A. Classification: Maximum of 25 for flame spread, fuel contributed, and smoke development.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Manufacturer's product specifications and installation instructions for each acoustical ceiling

material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.

Samples: Set of 12 inch square samples for each acoustical unit required, showing full range of exposed color and texture to be expected in completed work. Set of 12 inch long samples of each exposed runner and molding.

SUBSTITUTIONS

General: For products specified as above, Bids shall be based on products named in Project Manual or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

JOB CONDITIONS

Space Enclosure: Do not install interior acoustical ceilings until space enclosed and weatherproof, and until wet-work in space completed and nominally dry, and until work above ceilings completed, and until ambient conditions of temperature and humidity will be continuously maintained of values near those indicated for final occupancy.

PART TWO - PRODUCTS

ACOUSTICAL MATERIALS

General: Provide manufacturer's standard acoustical of type recommended by manufacturer for application indicated. Provide sizes as specified herein, and as indicate on reflected ceiling plans.

ACCEPTABLE MANUFACTURERS

Armstrong Acoustical Ceiling System
Suspension System – Suprafine 9/16"
Ceiling Tile – Dune Tegular #1775 9/16"
Beveled Tegular Fine Texture Size -
24"X24x5/8"
Tile Color - #WH White

CEILING SUSPENSION MATERIAL

General: Comply with ASTM C-635, as applicable to type of suspension system required for type of ceiling units indicated. Coordinate with other work supported by or penetrating through ceilings, including light

fixtures, HVAC equipment, and partition system (if any).

Edge Moldings: Manufacturer's standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish unless otherwise indicated. Moldings shall not be less than .020 inch cold rolled steel.

Finish of Exposed Members: Provide uniform factory-applied finish on exposed surfaces of ceiling suspension system, including moldings, trim and accessories.

- A. **Finish:** Manufacturer's standard baked enamel matte finish, white unless otherwise selected by Architect.
- B. **Toilet Room Finish:** Manufacturer's standard vinyl rust resistant finish, white unless otherwise selected by Architect.

REGULAR CEILING SUSPENSION SYSTEM

Two by Two Regular Ceiling Suspension System: Manufacturer's standard exposed runners, cross runners and accessories, of types and profiles indicated, with exposed cross runners coped to lay flush with main runners.

Type of System: Direct-hung suspension system.

Size: 24 inch by 24 inch.

Structural Class: Medium-duty system; double-web.

Products/Manufacturers: Provide one of following products:

- A. 200 Snap-Grid; Chicago Metallic Corporation.
- B. USG Donn DX Series; USG Interiors.
- C. Prelude XL 7300WH and 7301WH; Armstrong Ceilings.

MISCELLANEOUS MATERIALS

Accessories: Specifically designed for use with components to be installed as recommended by manufacturer.

Attachment Devices: Size for 5 times design load indicated in ASTM C-635, Table 1, Direct Hung.

Hanger Wires: Galvanized carbon steel, ASTM A-641, soft temper, prestretched, yield-stress load of at least 3 times design load, but not less than 12 gauge (0.106 inch).

Acoustical Sealant: Heavy-bodied, non-shrinking, non-drying, non-sag mastic compound intended for interior sealing of concealed construction joints.

Hold-Down Clips: Where required for wind uplift resistance or fire-resistance rating, provide standard spring steel clips, except provide accessible type at locations indicated on Drawings. Provide between column 2 and 3.

PART THREE - EXECUTION

INSPECTION

General: Installer must examine conditions under which acoustical ceiling Work is to be performed and must notify Contractor and Architect in writing of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

PREPARATION

Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.

Note: Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceilings. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.

GENERAL INSTALLATION REQUIREMENTS

General: Install materials in accordance with manufacturers printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.

SUSPENSION SYSTEM INSTALLATION

General: Install suspension systems to comply with ASTM C-636, with hangers supported only from building structural members. Locate hangers near each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8 inch in 12'-0".

Hangers: Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.

Edge Moldings: Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

- A. **Sealant Bed:** Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
- B. **Screw-attach moldings** to substrate at intervals not over 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.

Layout of Grid: Start grid layout in each space, area, at points indicated. In areas where grid layout is not indicated locate grid symmetrically in room, space. Coordinate work with other trades so that lighting fixtures, grilles, other ceiling fixtures work to grid layout.

References: Perform Work according to code of practices for "Acoustical Ceiling System Installation" as prepared by NACA, and specifications for acoustical tile and lay-in panel ceiling suspension system as prepared by the Acoustical Materials Association.

Precaution Note: Universal splices or other types which would obstruct passage of recessed lighting fixtures through grid openings, or make untenable their reposition upon flanges of beams, may not be used.

Note: Support suspension system from structure above, not from ductwork, equipment or piping.

ACOUSTICAL MATERIAL INSTALLATION

General: Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

Sequence: Install acoustical materials after concrete, plaster, masonry work in building is completely dry and after building is completely enclosed, after heating system is operating.

Hold-Down Clips: Install hold-down clips in areas indicated, and in areas where required by governing regulations or for fire-resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required. Provide hold-down clips between column lines two (2) and three (3) as indicated on drawings.

Fire-rated Acoustical Units: Installed in accordance with manufacturer's recommendations; in such a manner as to achieve specified fire-resistive time-design rating.

- A. Provide protection for recessed light fixtures in fire rated ceiling assembly as detailed.

ADJUSTMENT AND CLEANING

Adjustment: Remove and replace damage, stained or discolored lay-in acoustical units and suspension system.

Cleaning: Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

* * * * *

End of Section 09 51 00

PART ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide resilient flooring as indicated on Drawings and specified herein.

RELATED WORK

General: Following items of related work are specified in other sections:

- A. Concrete floor slabs: Section 03 30 00

QUALITY ASSURANCE

Manufacturers: Wherever possible, provide required resilient flooring and accessories produced by a single manufacturer.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Submit 2 copies of manufacturer's technical data and installation instructions for each type of resilient flooring and accessory.

Samples: Submit, for verification purposes, samples of each type, color, and pattern of resilient flooring, including accessories, required, indicating full range of color and pattern variation.

Maintenance Instructions: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in the Project Manual, or on items which the Architect has designated as an "approved equal". A product not named in the Project Manual or that is not approved by the Architect, in accordance with FP&C procedure in 4.3 Instruction to Bidders, shall not be acceptable. No substitutions shall be allowed after bids are received.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

MATERIAL HANDLING

Handling: Deliver and store in manufacturer's original, unopened containers and undamaged with legible and intact labels indicating brand names, colors and patterns and quality designations. Do not open containers or remove markings until materials are inspected and accepted by Architect.

Storage: Store in Work spaces in accordance with manufacturer's directions and recommendations and for no less than 48 hours before installation.

JOB CONDITIONS

Temperature Of Work Spaces: Insure minimum of 70 degrees F. and maximum of 90 degrees F., 48 hours before installation, during installation and 48 hours after installation and minimum of 55 degrees F. thereafter.

Sequence: Install resilient flooring and accessories after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test.

PART TWO - PRODUCTS

ACCEPTABLE MANUFACTURERS

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in work include, but are not limited to, following:

- A. Rubber Wall Base:
Johnsonite Baseworks Thermoset Rubber
- B. Rubber Stair Treads:
Johnsonite AngleFit Rubber Stair Treads with Integrated Riser Raised Round Tread Riser/Visually Impaired
- C. Rubber Flooring:
Johnsonite Solid Color Rubber Tile
Color – Smooth Solid 48 Grey Size - 24"x24"
- D. Luxury Vinyl Flooring:
Mannington Commercial – ID Latitude Color – Geneva 7530
Size – 6" x 48"

MATERIALS

Wall Base: Provide rubber base complying with FS SS-W-40, Type II, with matching end stops and preformed or molded corner units, and as follows:

- A. Standard top-set cove where rubber base is indicated.
 - 1. Height: 6 inches.

2. Thickness: 1/8 inch gauge.
3. Finish: Matte.

Luxury Vinyl Planks: Provide luxury vinyl planks complying with ASTM F1700, Class III, Type B.

- A. Geneva 7530
 1. Size: 6" x 48"
 2. Total Thickness: 0.120" (3.0 mm)
 3. Wear Layer Thickness: 20 mil (0.8 mm)
 4. Edge Treatment: Square Edge
 5. Warranty: 20-Year Limited Commercial Wear Warranty

ACCESSORIES

Adhesives (Cements): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

Leveling Compound: Latex type as recommended by flooring manufacturer.

CLEANING AND PROTECTION

General: Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring with heavy Kraft paper or other covering.

Finishing: After completion of Project and just prior to final inspection of work, thoroughly clean floors and accessories.

Final Finishing: Apply polish and buff, with type of polish, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions. Repeat cleaning, waxing and buffing immediately before store opening.

PART THREE - EXECUTION

INSPECTION

General: Installer must examine substrates and conditions to which resilient flooring is to be applied and notify Contractor and Architect in writing of conditions detrimental to proper and timely completion. Do not proceed with work until unsatisfactory conditions have been corrected acceptable to installer.

Moisture Test: Perform moisture test of concrete substrates in compliance with ASTM F-2170 (Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes) and ASTM F-1869 (Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride). For baseline information, tests for relative humidity can be started 30 days after the slab is poured. More accurate test results will be achieved closer to installation time. HVAC systems are to be functioning 24/7 for two weeks prior to installation and the temperature and ambient relative humidity has acclimated to occupancy conditions.

- A. Do not install resilient flooring on concrete substrates until moisture testing has been conducted to assure that moisture levels and alkalinity are acceptable to manufacturer of resilient flooring and

adhesive.

PREPARATION

General: Broom clean or vacuum surfaces to be covered, and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work.

- A. Use leveling compound as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.
- B. Perform bond and moisture tests on concrete slabs to determine that concrete surfaces are sufficiently cured, dried and ready to receive flooring.
- C. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

INSTALLATION

General: Install flooring using method indicated in strict compliance with manufacturer's recommendations. Extend flooring into the spaces, door reveals, and into closets and similar openings.

Note: In areas indicated to receive both resilient flooring and carpet, verify all floor covering dimensions prior to laying out resilient flooring. If resilient flooring is installed before carpet, protect edges with temporary wood strips or other approved method.

Reference Marks: Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

Cover Plates: Install flooring on covers for telephone and electrical ducts, and other such items as occur within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers. Tightly cement edges to perimeter of floor around covers and to covers.

Installation: Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll flooring at perimeter of each covered area to assure adhesion.

Lay-Out: Lay tile from center marks established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.

Pattern: Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable. Lay tile in "checkerboard" fashion with grain reversed in adjacent tiles.

Sequence: Install resilient flooring as follows:

- A. In areas indicated to receive both resilient flooring and carpet, verify all floor covering dimensions prior to laying out Resilient Flooring. If Resilient Flooring is installed before carpet, protect edges with temporary wood strips or other approved method.
- B. Install vinyl base where indicated on drawings.
- C. Install vinyl base in each area after wall fixtures are installed. Omit base behind wall fixtures; install base on front and returns (sides) of wall fixtures.

Adhesives: Adhere tile flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.

Note: Do not use curing compounds on concrete subfloors unless written approval is obtained from flooring manufacturer.

ACCESSORIES

Base: Apply wall base to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

Note: On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

Stair Accessories: Apply resilient accessories to stairs as indicated and in strict accordance with manufacturer's installation instructions.

ADJUSTMENTS

Replacement: Replace all flooring, base that does not stay down or properly adhere to subfloor.

CLEANING AND PROTECTION

General: Remove any excess adhesive or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring with heavy Kraft paper or other covering.

Finishing: After completion of Project and just prior to final inspection of work, thoroughly clean floors and accessories.

Final Finishing: Apply polish and buff, with type of polish, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions. Repeat cleaning, waxing and buffing immediately before building opening.

* * * * *

End of Section 09 65 00

ONE – GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Provide painting as indicated on Drawings and specified herein.

Work Included: Work in general includes painting and finishing of interior and exterior exposed items throughout Project; including ferrous metals, woodwork, concrete masonry, gypsum drywall, plaster and other items normally requiring paint finish unless otherwise indicated.

Special Note: Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.

Definitions: "Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as a prime, intermediate or finish coats.

General: Paint exposed surfaces whether or not colors are designated in "schedules", except where natural finish of material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Architect will select these from standard colors available for materials systems specified.

Note: Do not paint exterior concrete, exterior insulation and finish system, aluminum, and factory-finished materials.

Work Not Included: Following categories of work are not included as part of field-painted finish work, or are included in other sections of these specifications.

- A. **Shop Priming:** Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
- B. **Pre-Finished Items:** Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, elevator entrance frames, doors and equipment.
- C. **Concealed Surfaces:** Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
- D. **Finished Metal Surfaces:** Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise

indicated.

- E. Code Required Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

RELATED WORK

General: Following items of related work are included in other sections:

- A. Sealing of concrete floors: Section 03 30 00

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Product Data: Submit manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.

SUBSTITUTIONS

General: For products specified herein, Bids shall be based on products named in Project Manual, or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

COLORS AND SAMPLES

Paint Colors: As selected by Architect or Owner. Architect or Owner will furnish color chips, color schedule before painting Work is begun. Prepare samples as required. Do not proceed beyond "prime" or "size" stage until colors have been approved.

DELIVERY AND STORAGE

Delivery: Deliver materials to site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

- A. Name or title of material.
- B. Federal Spec. number, if applicable.
- C. Manufacturer's stock number and date of manufacture.

- D. Manufacturer's name.
- E. Contents by volume, for major pigment and vehicle constituents.
- F. Thinning instructions.
- G. Application instructions.
- H. Color name and number.

Storage: All paint materials used on Project shall be stored in a single place or space. Storage area shall be kept clean; all damage to storage area or its surrounding shall be repaired as required.

Note: Remove from building at end of each work day; oily rags, waste, etc.; take every precaution to avoid danger of fire.

JOB CONDITIONS

Paint Application: Apply paints as follows:

- A. Apply water-based paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50° F and 90° F, unless otherwise permitted by paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45° F and 95° F, unless otherwise permitted by paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.
- E. Reduction: Only in accordance with manufacturer's instructions.

PART TWO - PRODUCTS

GENERAL PRODUCT REQUIREMENTS

Paint, Enamel, Varnish, Stains: Of type hereinafter specified under Schedule of Painting headings.

Materials: Of highest quality of their respective types as made by Sherwin-Williams, ICI- Devoe/Glidden or Benjamin-Moore. Prior to beginning painting work, submit for approval complete list of manufacturer's products, trade names proposed for use; this is in addition to required prior approval of manufacturer. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

Color Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.

Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required.

Notice: Notify Architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

Federal Specifications: Minimum acceptable quality for paint materials. Provide written certification from paint manufacturer that materials provided meet or exceed these minimums.

Note: Manufacturer's products which comply with coating qualitative requirements of applicable Federal Specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Architect. Furnish material data and manufacturer's certificate of performance to Architect for any proposed substitutions.

Undercoats: Provide undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

PART THREE - EXECUTION

INSPECTION

General: Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor and Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.

Note: Starting of painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

Precaution: Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Follow all guidelines according to the respective manufacturer's product information guidelines.

SURFACE PREPARATION

General: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

Hardware Removal: Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.

Cleaning: Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly-painted surfaces.

Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, cement plaster and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.

Surface Tests: Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.

- A. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
- B. When transparent finish is required, use spar varnish for back-priming.
- C. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
- D. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

- A. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with same type shop primer.

Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

MATERIALS PREPARATION

General: Mix and prepare painting materials in accordance with manufacturer's directions.

Storage: Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.

Preparation: Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

APPLICATION:

General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied and as follows:

- A. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- B. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
- C. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
- D. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
- E. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.

- F. Sand lightly between each succeeding enamel or varnish coat.
- G. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

- A. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces.

Mechanical: Paint exposed primed or unpainted mechanical work in finished areas only; including pipe valves, supports, rods, equipment, fixtures, apparatus, grilles, cabinets, etc. In unpainted areas no painting is required, except touch-up. Protect name plates on all equipment. Paint grilles, diffusers to match adjacent surfaces.

- A. Uninsulated, Unprimed Pipe, Valves, Fittings, Supports, Rods, Etc. shall receive two coats semi-gloss enamel.
- B. Insulated Pipe, Apparatus shall receive one coat glue sizing; one coat enamel; sizing coat to be in addition to adhesive coat.
- C. Primed, Apparatus, Equipment shall receive two coats semi-gloss enamel.

Electrical: Panelboards, buss duct, fixtures, conduit shall be left unpainted, except abraded areas on factory finished products to be given one coat enamel to match factory finish.

Identification System: On all piping provide plastic tape color banding as directed; at 10 ft. intervals where exposed, at all hatchways, access points, parts throughout building; near all operating valves, equipment, colors as selected, generally use A.S.M.E. code colors.

Prime Coats: Apply prime coat of material which is required to be painted or finished, and which has not been prime coated by others.

- A. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfections.

Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface

imperfections.

- A. Provide satin finish for final coats, unless otherwise indicated.

Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

CLEAN-UP AND PROTECTION

Clean-Up: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each work day.

Final Clean-Up: Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

Signs: Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

Note: At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

PAINT SCHEDULE

General: Provide following paint systems of various exterior substrates, as indicated.

Paint System P-1: Zinc-Coated Metal; provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

- A. **Low-Luster Finish:** 2 finish coats over a galvanized metal primer.
- B. **Primer:** Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1. Devoe: 8502/8520 Mirrolac Interior/Exterior Waterborne Flat DTM Primer and Finish.
 - 2. Fuller: 621-05 Blox-Rust Latex Metal Primer.
 - 3. Glidden: 5205 Glid-Guard Tank & Structural Primer, Red.
 - 4. Moore: IronClad Galvanized Metal Latex Primer #155.
 - 5. PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
 - 6. Sherwin-Williams: ProCryl Universal Primer B66w610
- C. **First and Second Coat:** Low-luster (eggshell or satin), exterior, acrylic-latex paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.
 - 1. Devoe: 16XX Wonder-Shield Exterior Acrylic Latex Satin House and Trim Paint.
 - 2. Fuller: 261-XX Eggshell Sheen Latex House and Trim Paint.
 - 3. Glidden: 6700 Series Spred Ultra Exterior Satin Latex House and Trim Paint.
 - 4. Moore: MoorGard Latex House Paint #103.
 - 5. PPG: 76 Line Sun-Proof Exterior House & Trim Acrylic Satin Latex.
 - 6. Sherwin-Williams: Pro Industrial DTM Acrylic Egg Shell B66w1250 series.

Paint System P-2: Gypsum drywall walls in public areas shall be painted as follows:

- A. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1. Devoe:..... 50801 Wonder-Tones Interior Vinyl Latex Primer-Sealer.
 - 2. Fuller:.....220-20 Pro-Tech Interior Latex Wall Primer and Sealer.
 - 3. Glidden..... 5111 Spred Ultra Latex Primer-Sealer.
 - 4. Moore:..... Regal First Coat Interior Latex Primer & Underbody #216.
 - 5. PPG:.....17-10 Quick-Drying Interior Latex Primer-Sealer.
 - 6. Sherwin-Williams: Pro Mar 200 Zero Drywall Primer B28w2600
- B. Second Coat: Interior low luster eggshell enamel.
 - 1. Pratt & Lambert "Accolade Interior Velvet"
 - 2. Devoe:..... "Regency Interior Soft Lustre Number 25XX"
 - 3. Glidden..... "5800 Ultra Hide Lo Lustre Eggshell"
 - 4. PPG..... "Manor Hall Eggshell Latex 89 Line"
 - 5. Moore "Regal Aqua Velvet Number 319"
 - 6. Sherwin-Williams: ProMar 200 Zero Eg-Shel.B20W2650 Series.
- C. 3rd Coat - Interior low luster eggshell enamel.
 - 1. Pratt & Lambert "Accolade Interior Velvet"
 - 2. Devoe:..... "Regency Interior Soft Lustre Number 25XX"
 - 3. Glidden..... "5800 Ultra Hide Lo Lustre Eggshell"
 - 4. PPG..... "Manor Hall Eggshell Latex 89 Line"
 - 5. Moore "Regal Aqua Velvet Number 319"
 - 6. Sherwin-Williams: ProMar 200 Zero Eg-Shel.B20W2650 Series.

Paint System P-3: Uncoated ferrous metal exposed to view in all finished or painted areas and spaces (shop primed) shall be painted as follows. (Excluding decking and Structural steel within a Natatorium or that will be exposed to corrosive environmental conditions beyond typical circumstances)

- A. Semigloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer.
- B. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.
 - 1. Devoe:..... 3101 Mirrolac Rust Penetrating Metal Primer.
 - 2. Fuller:621-04 Blox-Rust Alkyd & Structural Metal Primer.
 - 3. Glidden..... 5207 Glid-Guard Tank & Structural Primer, White.
 - 4. Moore:.....IronClad Retardo Rust-Inhibitive Paint #163.
 - 5. PPG:.....6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
 - 6. Sherwin-Williams Kem Kromik Universal B50WZ1
- C. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1. Devoe:..... 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
 - 2. Fuller:220-07 Interior Alkyd Enamel Undercoat.
 - 3. Glidden..... 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
 - 4. Moore:..... Moore's Alkyd Enamel Underbody #217.
 - 5. PPG:.....6-6 Speedhide Interior Quick-Drying Enamel Undercoater.
 - 6. Sherwin-Williams: Pro Industrial DTM Acrylic Semi-Gloss. B66W1150 Series
- D. Finish Coat: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils
 - 1. Devoe:..... 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
 - 2. Fuller:214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.

3. Glidden..... 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
 4. Moore:.....Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
 5. PPG:.....88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi- Gloss Latex.
 6. Sherwin-Williams: Pro Industrail DTM Acrylic Semi-Gloss B66W1150 Series.
- E. First coat not required on items that are shop primed.

Paint System P-4: Painted woodwork shall be finished as follows:

- A. Semigloss, Acrylic-Enamel Finish: Two finish coats over a wood undercoater.
- B. Undercoat: Acrylic-latex-based, interior wood undercoater, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 1. Devoe:.....1701 Wonder-Prime All-Purpose Latex Primer Sealer & Vapor Barrier.
 2. PPG:.....6-755 Speedhide Interior Water-Based Undercoater.
 4. Sherwin-Williams:..... Premium Wall and Wood Ltx Primer B28W8111
- C. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.
 1. Devoe:..... 39XX Wonder-Tones Semi-Gloss Interior Latex Enamel.
 2. Fuller:214-XX AA Enamel Interior Acrylic Latex Semi-Gloss Enamel.
 3. Glidden..... 8200 Series Spred Ultra Latex Semi-Gloss Enamel.
 4. Moore:Moore's Regal AquaGlo Vinyl-Acrylic Latex Enamel #333.
 5. PPG:.....88-110 Satinhide Interior Enamel Wall & Trim Lo-Lustre Semi- Gloss Latex.
 6. Sherwin-Williams: Pro Industrial High Performance Acrylic. B66w650 Series.

Paint System P-5: Concrete Unit Masonry; provide the following block filler for application of epoxy paint. This system to be used in toilet, shower, locker rooms and the natatorium walls.

- A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.
 1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler No. 285: Applied at a dry film thickness of not less than 8.1 mils.
 2. Coronado; 946-11 Super Kote 5000 Commercial Latex Block Filler: Applied at a dry film thickness of not less than 8.4 mils.
 3. Dulux Paint; Bloxfil 4000-1000 Interior/Exterior Heavy Duty Acrylic Block Filler: Applied at a dry film thickness of not less than 7.0 to 14.5 mils.
 4. Kelly-Moore; 521 Fill and Prime Acrylic Block Filler: Applied at a dry film thickness of not less than 10.0 mils.
 5. M. A. B. Paint; Block Kote No. 1000 Acrylic Latex Block Filler 064-145: Applied at a dry film thickness of not less than 12.0 mils.
 6. Pittsburgh Paints; 6-7 SpeedHide Interior/Exterior Masonry Latex Block Filler: Applied at a dry film thickness of not less than 6.0 to 12.5 mils.
 7. Sherwin-Williams: Heavy Duty Block Filler B42w46
- B. First Coat: Sherwin-Williams: Pro Industrial Pre-Cat Epoxy K46 Series.
- C. Second Coat: Sherwin-Williams:: Pro Industrial Pre-Cat Epoxy K46 Series.

Paint System P-6: Concrete floors shall be painted as follows:

- A. In those Rooms that contain electrical panels, the floor is to be marked with paint to designate the

3'-0" clear area required around the electrical equipment. The interior of this area is to be painted solid with the same color paint.

1. Concrete Floor Paint: As follows:
 - a. 1st Coat - Concrete conditioner
 - b. 2nd Coat - Polyurethane coating (TT-P-542, Type II).
 - c. 3rd Coat - Polyurethane coating (TT-P-542, Type II).
 - d. Field Color: Yellow.
2. Graphics: As follows:
 - a. Text: **DO NOT STORE**
 - b. Text Size: 4 inches.
 - c. Text Color: Red.

SURFACES NOT TO BE PAINTED

General: Following surfaces will not require field painting:

- A. Surfaces indicated on drawings as unpainted.
- B. Sprinkler heads.
- C. Items listed under "General" Heading.

* * * * *

End of Section 09 90 00

PART ONE - GENERAL**RELATED DOCUMENTS**

General: Bidding and/or Negotiations Requirements, General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section.

WORK INCLUDED

Scope: Furnish all material, labor and engineering services necessary to program facility and to fabricate and install signage. Provide identifying devices at all permanent public rooms and at exit doors.

RELATED WORK**REFERENCES**

General: Signs and their installation shall comply with applicable provisions of the latest edition of the following standards and with requirements of authorities having jurisdiction:

- A. ADAAG – Americans with Disabilities Act Accessibility Guidelines; US Architectural and Transportation Barriers Compliance Board.
- B. International Code Council/American National Standards Institute A117.1-Standard on Accessible and Usable Buildings Facilities.
- C. National Fire Protection Association 101 Life Safety Code.

Programming: Sign contractor shall perform all wayfinding and programming. Programming shall include location plan, message schedule and fire/evacuation graphics. Contractor shall follow the facility-wide room numbering identification system. The numbering plan as well as all programming materials shall be submitted for approval.

CODE COMPLIANCE

General: It shall be the responsibility of the successful bidder to meet any and all local, state, and federal code requirements in fabricating and installing signs.

SUBMITTALS

General: Submit in accordance with requirements of Section 01 33 23 - "Shop Drawings, Product Data and Samples".

Signage Schedule: Signage schedule in manufacturer's format for verification of text/copy.

Shop Drawings: Approval drawings showing materials, construction detail, lay-out, copy, size and mounting methods.

Product Data: Submit manufacturer's technical data and installation instructions for each type of sign

required.

Samples: Submit samples of each color and finish of exposed materials and accessories required for signs. Architect's review of samples will be for color and texture only. When requested, furnish full-size samples of sign materials.

- A. Sample of two sign types for verification of materials, color, pattern, overall quality, and for adherence to drawings and requirements indicated.

QUALIFICATIONS

General: Manufacturer specializing in manufacturing the products specified in this section with minimum five years' experience. Obtain signs from one source and a single manufacturer.

SUBSTITUTIONS

General: For products specified as above, Bids shall be based on products named in Project Manual or on items which Architect has designated as an "approved equal". A product not named in Project Manual or that is not approved by Architect, shall not be acceptable. No substitutions shall be allowed after bids are received.

Requests for Substitutions: Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect seven (7) working days prior to the Bid Opening Date.

Submittals: Submit a separate request for each Product in accordance with requirements of Section 01 62 00 - "Substitutions and Product Options".

Note: Architect's or Owner's approval of an item for a previous project does not constitute approval for this Project.

DELIVERY, STORAGE, PROTECTION

General: Package to prevent damage or deterioration during shipment, handling, storage and installation. Products should remain in original packaging until removal is necessary. Store products in a dry, indoor location.

STANDARDS MANUAL

Note: Manufacturer shall provide a comprehensive Standards Manual in both a paper and PDF format. The manual shall include all renderings, drawings, location plan, message schedule, insert templates, mounting detail, and reorder information.

WARRANTY

General: Provide manufacturer's warranty against defects in materials or workmanship for minimum 5 years.

PART TWO - PRODUCTS

MANUFACTURER

General: Signage shall be Best Sign Systems, Inc., 1202 N. Park Avenue, Montrose, CO 81401, 1.800.235.1BEST or Architect approved equal.

SIGN STANDARDS

General: Manufacturer's standard monolithic tactile plaque constructed utilizing a thermoforming process, which provides a fully homogeneous plaque sign. The sign body, face, raised text and Braille are compression molded to form a single dimensional component that results in a sign surface that exhibits a toughness that resists scratching, cracking, gouging and graffiti.

- A. Style: Custom Lucent Sign by Best Sign Systems or approved equal
- B. Material: Extruded Clear Acrylic
- C. Sign Thickness: ¼ inch (6mm)
- D. Tactile Characters/Symbols: Raised 1/32 inch (1mm) from sign plate face
- E. Construction: One-piece; added on or engraved characters not acceptable
- F. Lettering Style: Typeface as selected from manufacturer's standard sans serif or simple serif typeface, upper case letters, minimum height 5/8", maximum height 2"
- G. Braille: Grade 2 braille, placed directly below last line of letters or numbers
- H. Contrast: Letters, numbers and symbols shall contrast with background.
- I. Bevel Options: 45 degree
- J. Color of Background: Colors chosen from 73 standard paint colors, subsurface or surface applied
- K. Color of Text or Raised Characters: Metallic – Gold
- L. Surface Texture: Slate

PART THREE - EXECUTION

EXAMINATION

Installer shall examine signs for defects, damage and compliance with specifications. Installation shall not proceed until unsatisfactory conditions are corrected.

INSTALLATION

General: Installation locations shall be in accordance with ADA specifications. Locate signs where indicated using mounting methods in compliance with manufacturer's written instructions.

- A. The signage contractor will coordinate installation schedules with the Owner and/or Construction Manager.
- B. Installation shall be performed by manufacturer's personnel trained and certified in manufacturer's methods and procedures.
- C. Installer to submit CAD generated location plan noting the location of all signage and cross referenced to message schedule for architect's approval.
- D. Installer to conduct a pre-installation survey prior to manufacturing to verify message schedule copy and sign location. Each location shall be noted using low tack vinyl. Full scale renderings of directories and directionals shall also be provided. Any location discrepancy or message issue shall be submitted to architect for review.
- E. Signs shall be level, plumb, and at heights indicated with sign surfaces free from defects.
- F. Upon completion of the work, signage contractor shall remove unused or discarded materials, containers and debris from site.

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End of Section 10 14 23

22 01 00

BASIC MECHANICAL MATERIALS AND METHODS FOR PLUMBING AND HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems
 - 2. Dielectric fittings
 - 3. Flexible connectors
 - 4. Sleeves
 - 5. Escutcheons
 - 6. Grout
 - 7. Mechanical demolition
 - 8. Equipment installation requirements common to equipment sections
 - 9. Painting and finishing
 - 10. Supports and anchorages
 - 11. Access panels
 - 12. Anti-huffing devices

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete in every respect and ready for the intended use, as applicable in each instance.
- I. "Inspect": The term "inspect" or "inspection": when used to describe observation of the Contractor's Work by the Engineer shall mean an endeavor to guard the Owner against defects and deficiencies in the Work and to determine, in general, if the Work is being performed in a manner such that, when completed, it will be in accordance with the Contract Documents.
- J. Wiring: the term "wiring" shall include providing raceway, conductors, and cable in accordance with the requirements of Division 26.

- K. The following are industry abbreviations for plastic materials:
 - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
 - 2. PVC: Polyvinyl chloride plastic.
- L. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:

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- 1. Dielectric fittings.
 - 2. Escutcheons.
- B. Shop Drawings: Detail fabrication and installation for metal supports and anchorage for mechanical materials and equipment.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Equipment Selection: Equipment of higher electrical characteristics, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are appropriately modified. The Contractor will be responsible for any added costs for such modifications. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.
- C. Drawings: The Mechanical Drawings show the general arrangement of piping, equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit. The Mechanical work shall conform to the requirements shown on all the Drawings. Because of the small scale of the Mechanical Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall investigate the structural and finish conditions and other building components affecting the work and shall arrange his work accordingly, providing such offsets, fittings, and accessories as may be required to meet such conditions. No extras will be approved for required additional offsets and fittings. Any offsets or additional fittings required to coordinate mechanical systems with existing conditions and other trades, or that are necessary for the complete installation of the system, including modifications to shop or off-site fabricated piping and/or ductwork, all shall be provided by the Contractor at no additional cost to the Owner.
- D. Codes and Standards: comply with the following codes. Comply with the latest edition except where indicated otherwise or a specific edition is required by the authority having jurisdiction:
 - 1. International Building Code
 - 2. International Fuel Gas Code
 - 3. International Mechanical Code
 - 4. International Plumbing Code with Louisiana Amendments
 - 5. Louisiana State Energy Code
 - 6. NFPA 54, 70, 72, 90A, 90B, and 101
 - 7. All applicable local codes

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.

- 1.7 COORDINATION
- A. Coordinate mechanical equipment installation with other building components and existing conditions.
 - B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
 - C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.
 - D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.
 - E. Coordinate connection of mechanical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Costs for all utility connections shall be the Contractor's responsibility, including any connections made by the utility company.
 - F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.
 - G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and other concealment.

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PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
- A. Manufacturers: Subject to compliance with requirements, provide products by firms regularly engaged in the manufacture of products required, whose products have been in satisfactory use in similar service.
- 2.2 PIPE, TUBE, AND FITTINGS
- A. Refer to individual Division 22 and 23 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for pipe, tube, and fitting materials and joining methods.
 - B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- 2.3 JOINING MATERIALS
- A. Refer to individual Division 22 and 23 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for special joining materials not listed below.
 - B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
 - C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
 - D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
 - E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

- F. Brazing Filler Metals: AWS A5.8, BAg1, silver alloy.
 - G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 - H. Solvent Cements for Joining Plastic Piping:
 - 1. ABS Piping: ASTM D 2235.
 - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 3. PVC to ABS Piping Transition: ASTM D 3138.
 - I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.
- 2.4 DIELECTRIC FITTINGS
- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, flanged, solder-joint, plain, or weld-neck end connections that match piping system materials and isolate joined dissimilar metals to prevent galvanic action and stop corrosion.
 - B. Insulating Material: Suitable for system fluid, pressure, and temperature.
 - C. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 degrees F (107 degrees C).
- 2.5 SLEEVES
- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
 - B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- 2.6 ESCUTCHEONS
- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
 - B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 - C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
 - D. Split-Plate, Stamped-Steel Type: With concealed hinge, spring clips, and chrome-plated finish.
 - E. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.
- 2.7 GROUT
- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.
- 2.8 ACCESS PANELS
- A. Access Panels (Toilet and Bath Rooms): Flush stainless steel, 180 degrees door with concealed hinges, key-actuated lock, frame and flexible anchor straps.
 - B. Access Panels: (Elsewhere): Flush metal hinged access panel and frame (type as required for surface encountered), prime coat finish, and key actuated cylinder lock.
 - C. Access Panels: Minimum size 12 inch x 12 inch. Locate over device to be serviced.
- 2.9 ANTI HUFFING DEVICES
- A. Provide locking access port caps for all outdoor equipment containing refrigerant. Caps shall be tamper resistant and secured to prevent unauthorized access.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

- A. Refer to Division 1 Sections, "Cutting and Patching" and "Selective Demolition" for general

- demolition requirements and procedures.
 - B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.
- 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS
- A. Install piping according to the following requirements and Division 22 and 23 Sections specifying piping systems.
 - B. Install components with pressure rating equal to or greater than system operating pressure.
 - C. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
 - D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
 - E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
 - F. Install couplings according to manufacturer's written instructions.
 - G. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 - H. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
 - I. Install all buried water piping, regardless of content, a minimum of 12 inches below and 12 inches laterally from any buried electrical line. Whether in conduit or direct buried cable, this requirement shall apply regardless of voltage of the electrical line.
 - J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - K. Install piping to permit valve servicing.
 - L. Install piping at indicated slopes.
 - M. Install piping free of sags and bends.
 - N. Install fittings for changes in direction and branch connections.
 - O. Pulled-tee, extruded-tee, thread-o-let, weld-o-let, and mitered elbow connections are not acceptable, unless specifically indicated otherwise. Provide manufactured tee and elbow fittings.
 - P. Install tees with removable threaded cleanout plugs at each change in direction in all condensate drain piping.
 - Q. Select system components with pressure rating equal to or greater than system operating pressure.
 - R. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: Cast-brass type with chrome-plated finish, split-casing for existing piping, and one-piece for new piping.
 - c. Insulated and Bare Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - d. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
 - S. Sleeves are not required for core-drilled holes.
 - T. Permanent sleeves are not required for holes formed by removable PE sleeves.
 - U. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
 - b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating interior walls.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section, "Sheet Metal Flashing and Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- V. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section, "Through- Penetration Firestop Systems" for materials.
- W. Verify final equipment locations for roughing-in.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements, Division 22 and 23 Sections, and Schedules on the Drawings, specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. 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 unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
 5. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Non-Pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Manufacturer's Installation and Operating Instructions: All equipment and material shall be installed and operated in strict accord with manufacturer's "Installation and Operating Instructions." The manufacturer's installation instructions shall become part of this Specification, and shall take precedence over and/or supplement any Specification herein and as shown and/or described on plans. All individual items of equipment and components thereof shall be 100 percent accessible for repair, removal, or replacement without functional impairment or dismantling of any adjoining major surfaces or assemblies.
- B. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- E. Install equipment to allow right of way for piping installed at required slope.
- F. Cut and drill floors, roofs, walls, partitions, ceilings, and other surfaces as required to permit installation of mechanical piping, ducts, and equipment. Perform cutting by skilled mechanics of trades involved.
- G. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.
- H. Electrical Work: Wherever equipment requiring electrical power connection is specified, all wiring shall be furnished and installed under Division 26 of the Specifications. Starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various Division 22 and 23 Sections, and installed and electrically connected complete under Division 26 unless otherwise specifically noted, except that control devices that are installed in or on ducts, piping, or mechanical equipment shall be mounted under Divisions 22 and 23. If equipment is furnished requiring power wiring different from that indicated on the Electrical Drawings, the Contractor furnishing the equipment shall be responsible for any required revisions and pay any additional costs connected therewith. Wiring revisions shall be submitted to the Architect for approval prior to installation.
 1. Contractors furnishing items to be wired shall provide adequate wiring diagrams.
 2. Temperature control wiring shall be furnished and installed in raceway under Division 23 according to the requirements of Division 26, specifically Section, "Conductors and Cables," and Section, "Raceways and Boxes."

3.6 EARTHWORK

- A. Refer to Division 2 Section, "Earthwork" for excavation, trenching and backfilling.

3.7 PAINTING

- A. Touching Up: 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. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section, "Painting."
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-

repair paint to comply with ASTM A 780.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 Section, "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.10 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.11 MISCELLANEOUS

- A. Services: Provide gas, water, sanitary sewer, and services as indicated.
- B. The Contractor shall, before submitting a proposal, verify the location, depth, size, and pressure or grade of existing main gas, water and sewer lines to which he is to make connections for services to the building and shall include in his bid the cost of any required revisions. If for any reason conditions appear that will adversely affect the proper installation and operation of the systems, such conditions shall be reported to the Architect in writing for his decision ten days prior to bid date. All connection charges, cutting and patching of paving, etc. required for connection to utility lines, including those provided by the utility company, shall be paid for or provided by the Contractor. Make provisions for metering as indicated and as required by the serving utilities. Locations of plumbing lines and point of service entrance are shown in accordance with data provided by various departments of city and/or utility companies involved. The points of connection to the utility lines are approximate only and shall be verified by each bidder. Each bidder shall include adequate funds in his bid price to cover all cost of connections to utility lines regardless of exact location, or those who make the connection, and shall hold the Owner harmless as to additional costs or extras regarding utility connections.
- C. Sewage Backwater Valves: Where the flood level rims of plumbing fixtures are below the elevation of the manhole cover of the next upstream manhole in the public sewer, such fixtures shall be protected by a backwater valve installed in the building drain, branch of the building drain or horizontal branch serving such fixtures, regardless of whether indicated on the Drawings or not. Plumbing fixtures that have flood level rims above the elevation of the manhole cover of the next upstream manhole in the public sewer shall not discharge through a backwater valve. Where such conditions are found to exist, revise piping as required to install backwater valves. Submit proposed revisions to the Architect for approval. Use of floor drains with integral backwater valves is acceptable where flood level elevations involve only floor drains and do not involve fixtures with flood level rims above the finished floor. Backwater valves shall be accessible.

- D. Access Panels: Provide access panels as indicated. In addition, provide access panels for each concealed item requiring service or adjustment that would otherwise be inaccessible whether shown or not. Access panel locations shown on drawings are approximate. Exact location shall be verified with the Architect prior to installation. Deliver access panels to trade responsible for finish surfaces in which access panels are to be installed.
- E. Refrigerant Circuit Access Caps: Provide tamper resistant-locking type caps at each piece of outdoor equipment.

END OF SECTION

22 05 00

HANGERS AND SUPPORTS FOR PLUMBING AND HVAC

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 hangers and supports for mechanical system piping and equipment.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

- A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.
- B. Welding Certificates: Copies of certificates for welding procedures and operators.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Firms regularly engaged in manufacture of supports and hangers, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 MANUFACTURED UNITS

- A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
 - 1. Nonmetallic Coatings: On hangers for electrolytic protection where hangers are in direct contact with copper tubing.

2.3 MISCELLANEOUS MATERIALS

- A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.
- B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger requirements are specified in Sections specifying equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.
- C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
- D. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).
- E. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.
- F. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification 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 degrees F (49 to 232 degrees C) piping installations.
 - 3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
- G. Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.
- H. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
- I. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
- J. Thermal-Hanger Shield Inserts:
 - 1. Description: 100 psig (690 kPa) minimum, compressive-strength insulation insert encased in sheet metal shield.
 - 2. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
 - 3. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
 - 4. For Hangers and Clamped Systems: Insert and shield shall cover entire circumference of pipe.
 - 5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. All hangers for equipment and piping are to be supported from building structure even if structural enhancements to roof support is required.
- B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.
- C. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- E. 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.

- F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.
- H. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- I. Support vertical piping at each floor and roof.
- J. Insulated Piping: Comply with the following:
 - 1. All hangers and supports shall be external of insulation.
 - 2. Install MSS SP-58, Type 40 protective shields on all insulated piping. Shields shall span arc of 180 degrees.
 - 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.
- B. Field Welding: Comply with AWS D1.1 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 contours of welded surfaces match adjacent contours.
- C. Any vertical structural members required to form overhead attachments for hangers or equipment supports shall be located adjacent to walls and any horizontal members be adjacent to the roof structure.

3.5 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

- A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Sections.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION

22 05 53

MECHANICAL IDENTIFICATION FOR PLUMBING AND 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 1 Specification Sections, apply to this Section.
- 1.2 SUMMARY
 - A. This Section includes mechanical identification materials and devices.
- 1.3 SUBMITTALS
 - A. Product Data: For identification materials and devices.
 - B. Samples: Of color, lettering style, and graphic representation required for each identification material and device.
- 1.4 QUALITY ASSURANCE
 - A. Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.
- 1.5 SEQUENCING AND SCHEDULING
 - A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

- 2.1 IDENTIFYING DEVICES AND LABELS
 - A. General: Products specified are for applications referenced in other Division 22 and 23 Sections. If more than single type is specified for listed applications, selection is Installer's option.
 - B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - 2. Location: Accessible and visible.
 - C. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
 - D. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.
 - E. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.
 - F. Lettering: Manufacturer's standard preprinted captions as selected by Engineer.
 - 1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.
 - G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils (0.08 mm) thick.
 - 1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
 - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
 - H. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - 1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - 2. Thickness: 1/16 inch (2 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.
 - 3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
 - I. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.
 2. Yellow: Heating equipment and components.
 3. Brown: Energy reclamation equipment and components.
 4. Blue: Equipment and components that do not meet criteria above.
 5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
 6. Terminology: Match schedules as closely as possible. Include the following:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.
- J. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.
1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING PIPING SYSTEMS

- A. Install pipe markers on each system. Include arrows showing normal direction of flow.
- B. Marker Type: Plastic markers, with application systems.
- C. Fasten markers on pipes and insulated pipes smaller than 6 inches (150 mm) OD by one of following methods:
 1. Snap-on application of pre-tensioned, semi-rigid plastic pipe marker.
- D. Fasten markers on pipes and insulated pipes 6 inches (150 mm) in diameter and larger by one of following methods:
 1. Laminated or bonded application of pipe marker to pipe or insulation.
 2. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches (40 mm) wide, lapped a minimum of 3 inches (75 mm) at both ends of pipe marker, and covering full circumference of pipe.
 3. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.
- E. Locate pipe markers and color bands where piping is exposed; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs. Mark each pipe at branch, where flow pattern is not obvious.
 3. Near penetrations through walls, floors, ceilings, or nonaccessible 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 a maximum of 50-foot (15-meters) intervals along each run. Reduce intervals to 25 feet (7.5 meters) in areas of congested piping and equipment.

3.2 EQUIPMENT SIGNS AND MARKERS

- A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:
 1. Split system air conditioning units (inside and outside units)
 2. Packaged rooftop units
 3. Fans/power ventilators

3.3 ADJUSTING AND CLEANING

- A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.
- B. Clean faces of identification devices and glass frames of valve charts.

END OF SECTION

22 07 19

PIPE INSULATION FOR PLUMBING AND HVAC

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 preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.
- B. Related Sections include the following:
 - 1. Division 23 Section, "Duct Insulation" for insulation for ducts and plenums.
 - 2. Division 22 Section, "Hangers and Supports for plumbing and HVAC" for pipe insulation shields and protection saddles.

1.3 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets, for each type of product indicated.
- B. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section, "Hangers and Supports for Plumbing and HVAC."
- B. Coordinate clearance requirements with piping Installer for insulation application.
- C. Coordinate installation and testing of steam or electric heat tracing.

1.7 SCHEDULING

- A. Schedule insulation application after testing piping systems. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers regularly engaged in the manufacture of piping insulation products of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

- 2.2 INSULATION MATERIALS
- A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:
1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.
 2. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.
 3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:
 - a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.
 - b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.
 4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.
 5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.
 6. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
1. Adhesive: As recommended by insulation material manufacturer.
 2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.
- 2.3 FIELD-APPLIED JACKETS
- A. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils (0.5 mm) thick; pre-curved ready for shop or field cutting and installing.
1. Adhesive: As recommended by insulation material manufacturer.
 2. PVC Jacket Color: White or gray.
- Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- (0.5 mm-) thick, high-impact, ultraviolet-resistant PVC.
- B.
1. Shapes: 45 and 90 degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.
 2. Adhesive: As recommended by insulation material manufacturer.
- 2.4 ACCESSORIES AND ATTACHMENTS
- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass- fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. yd. (270 g/sq. m).
1. Tape Width: 4 inches (100 mm).
- Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:
- B. 1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.
- Wire: 0.080 inch (2.0 mm), nickel-copper alloy; 0.062 inch (1.6 mm), soft-annealed,
- C. stainless steel; or 0.062 inch (1.6 mm), soft-annealed, galvanized steel.
- 2.5 VAPOR RETARDERS
- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION
- A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.
- 3.3 GENERAL APPLICATION REQUIREMENTS
- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written

instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Seal joints and seams with vapor-retarder mastic.
- G. Keep insulation materials dry during application and finishing.
- H. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- I. Apply insulation with the least number of joints practical.
- J. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.
- K. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.
 - 1. Apply insulation continuously through hangers and around anchor attachments.
 - 2. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
 - 3. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.
- L. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- M. Apply adhesives and mastics at the manufacturer's recommended coverage rate.
- N. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Circumferential Joints: Cover 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 and spaced 4 inches (100 mm) o.c.
 - 3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply 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 4 inches (100 mm) o.c.
 - a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.
 - 4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.
 - 5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.
- O. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.
- P. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

3.4 MINERAL-FIBER INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.
 - 2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 m) to form a vapor retarder between pipe insulation segments.

3. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.
- B. Apply insulation to flanges as follows:
 1. Apply preformed pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the 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. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.
- C. Apply insulation to fittings and elbows as follows:
 1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
 3. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.
- D. Apply insulation to valves and specialties as follows:
 1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body to thickness equal to adjoining pipe insulation. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.
 3. Apply insulation to flanges as specified for flange insulation application.
 4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

3.5 FLEXIBLE ELASTOMERIC THERMAL INSULATION APPLICATION

- A. Apply insulation to straight pipes and tubes as follows:
 1. Follow manufacturer's written instructions for applying insulation.
 2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.
- B. Apply insulation to fittings and elbows as follows:
 1. Apply mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.6 FIELD-APPLIED JACKET APPLICATION

- A. Apply PVC jacket over all piping, fittings, valves, flanges, etc. located in equipment rooms and mechanical rooms, up to an elevation of 6'-0" above the finished floor of the space. Apply with 1 inch (25 mm) overlap at longitudinal seams and end joints. Seal with manufacturers' recommended adhesive.

3.7 PIPING SYSTEM APPLICATIONS

- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
- B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 1. Flexible connectors.
 2. Vibration-control devices.

3.8 FIELD QUALITY CONTROL

- A. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.
- B. Reinstall insulation and covers on fittings and valves if required to be uncovered for inspection according to these Specifications.

3.9 INSULATION APPLICATION SCHEDULE, GENERAL

- A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.
- B. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.10 INTERIOR INSULATION APPLICATION SCHEDULE

- A. This application schedule is for interior insulation inside the building.
- B. Service: Domestic cold water.
 - 1. Operating Temperature: 35 to 60 deg F (2 to 15 deg C).
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following insulation thicknesses:
 - a. Copper Pipe, 1 Inch and Smaller: 1/2 inch.
 - b. Copper Pipe, 1-1/4 Inches and Larger: 1 inch.
 - 4. Field-Applied Jacket: PVC for exposed piping in Equipment Rooms.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- C. Service: Domestic hot water and hot water return.
 - 1. Operating Temperature: 60 to 140 deg F (15 to 60 deg C).
 - 2. Insulation Material: Mineral fiber.
 - 3. Insulation Thickness: Apply the following thicknesses:
 - a. Runouts up to 2 Inches and less than 12 Foot length: 1/2 inch.
 - b. 2 Inches size and less: 1 inch.
 - c. 2-1/2 Inches size and larger: 1-1/2 inches.
 - 4. Field-Applied Jacket: PVC for exposed piping in Mechanical Rooms.
 - 5. Vapor Retarder Required: No.
 - 6. Finish: None.
- D. Service: Condensate drain piping.
 - 1. Operating Temperature: 35 to 75 deg F (2 to 24 deg C).
 - 2. Insulation Material: Flexible elastomeric.
 - 3. Insulation Thickness: 3/4 inch.
 - 4. Field-Applied Jacket: None.
 - 5. Vapor Retarder Required: Yes.
 - 6. Finish: None.
- E. Service: Exposed sanitary drains and domestic water supplies and stops for fixtures for the disabled.
 - 1. Insulate and jacket with factory insulation and white PVC jacket kit conforming to ADA and equivalent to Truebro "Handi Lav-Guard", McGuire Manufacturing Co. "ProWrap", or approved equivalent.

END OF SECTION

DOMESTIC WATER PIPING SYSTEMS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 DESCRIPTION OF WORK

- A. Extent of domestic water piping systems work is indicated on the Drawings and schedules and by requirements of this Section.
- B. Applications for domestic water piping systems include the following:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
- C. Refer to appropriate Division 22 and 23 Sections for insulation required in connection with domestic water piping; not work of this Section.
- D. Trenching and backfill required in conjunction with exterior water piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of domestic water piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.
- B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data for domestic water piping systems, materials, and products.

PART 2 - PRODUCTS**2.1 DOMESTIC WATER PIPING MATERIALS AND PRODUCTS**

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated and scheduled. Where not indicated or scheduled, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems. Where more than one type of material or product is indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION

- A. General: Provide identification complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the following listing:
 - 1. Water Service: Underground-type plastic line markers.

2.3 BASIC PIPE, TUBE, AND FITTINGS

- A. General: Provide pipe, tube, and fittings complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the schedule on the Drawings.

2.4 BASIC HANGERS AND SUPPORTS

- A. General: Provide hangers and supports complying with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

- 2.5 BASIC VALVES
- A. Ball Valves – 2 Inches (DN50) and Smaller: MSS SP-110, Class 150, 600 psi (4140 kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2 inch (DN15) valves and smaller and conventional port for 3/4 inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded end connections.
- Operator: Vinyl-covered steel lever handle.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:
 - Milwaukee, BA100.
 - Appollo, #70-100.
 - Hammond, #8501.
 - Nibco, #585.
- B. Gate Valves 2-1/2 Inches and Larger:
- Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:
 - Crane #461.
 - Jenkins #7326.
 - Nibco #F-619.
 - Hammond #1R1138.
- 2.6 SPECIAL VALVES
- A. General: Special valves required for domestic water piping systems include the following types:
- Interior Hose Bibb: 3/4 inch angle sill faucet, polished chrome plated, fixed wheel handle, and with vacuum breaker.
 - Exterior Sillcocks: 3/4 inch size, non-freeze type with anti-siphon backflow preventer and brass casing:
 - Wade: Model 8600.
 - Josam: Model Z-1321.
 - Exterior Sillcocks: For locations where wall thickness will not permit non-freeze sillcock and piping to be fully concealed, provide mild climate type with integral backflow preventer.
 - Wade: Model 8600MT.
 - Zurn: Model Z-1333.
- 2.7 TRAP SEAL PRIMER VALVES
- A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics. Provide where a trap primer is required by code or is shown on the Drawings.
- Manufacturers:
 - Precision Plumbing Products, Inc.
 - 125-psig (860-kPa) minimum working pressure.
 - Bronze body with atmospheric-vented drain chamber.
 - Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.
 - Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.
 - Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
- 2.8 DRAIN VALVES
- A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 (DN 20) ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.
- Inlet: Threaded or solder joint.
 - Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.
- 2.9 WATER HAMMER ARRESTERS
- A. General: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
- Manufacturers:
 - Josam Co.
 - Precision Plumbing Products, Inc.

- c. Sioux Chief Manufacturing Co., Inc.
- d. Zurn Industries, Inc.; Wilkins Div.

2.10 BACKFLOW PREVENTERS

- A. General: Provide reduced pressure, principle backflow preventers consisting of assembly, including shutoff valves on inlet and outlet and strainer on inlet. Backflow preventers shall include test cocks and pressure-differential relief valve located between two positive seating check valves and drain. Construct in accordance with ASSE Standard 1013. Include air gap and elbow for drain.
- B. Manufacturer: Subject to compliance with requirements, provide backflow preventers of one of the following:
 - 1. Febco, 825 Series
 - 2. Hersey, "Aergap" Series
 - 3. Orion, BRP
 - 4. Watts, 009

Series PART 3 -

EXECUTION

2.1 EXCAVATION

- A. Excavating, trenching, and backfilling are specified in Division 2 Section, "Earthwork."

3.2 INSTALLATION OF DOMESTIC WATER PIPING

- A. General: Install water distribution piping in accordance with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC Systems."

3.3 INSTALLATION OF PIPING SPECIALTIES

- A. Water Hammer Arresters: Install in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated.
- B. Trap Seal Primer Valves: Install trap seal primer valves with outlet pitched down toward drain tap a minimum of 1 percent and connect to floor drain, trap or inlet fitting. Adjust valve for proper flow.
- C. Install wood blocking reinforcement for wall mounting and recessed type plumbing specialties.
- D. Install individual ball type shutoff valve in water supply to trap seal primer valve and install minimum 12 inches x 12 inches access panel over valve and trap primer.

3.4 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

3.5 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by governing Plumbing Code.
- B. Rough-in and connect all equipment, including kitchen equipment, including any interconnecting piping. Provide stops at each item. Rough-in in accord with equipment suppliers rough-in drawings. Provide all water piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendations.

3.6 INSTALLATION OF BACKFLOW PREVENTERS

- A. Install backflow preventers where indicated and where required by International Plumbing Code or Louisiana Amendments. Locate in same room as equipment being protected. Pipe relief outlet to nearest floor drain. Include (soft disc) check valve ahead of the installation to lock in

the downstream pressure as not to affect the operation pressure differential between the supply and downstream of the first check in the backflow preventer. Provide aboveground insulated enclosure where indicated.

3.7 FIELD QUALITY CONTROL

- A. Test water and hot water piping throughout hydrostatically at 150 p.s.i.g. (four hours).
- B. Repair or replace domestic water piping as required to eliminate leaks and retest as specified to demonstrate compliance.
- C. Sterilization: Sterilize all water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

END OF SECTION

SOIL, WASTE, AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Extent of soil, waste, and vent piping system work is indicated on Drawings and Schedules, and by requirements of this Section.
- B. Trenching and backfilling required in conjunction with underground drain piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of piping products of types, materials, and sizes required, whose products have been in satisfactory use in similar service.
- B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.
- C. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of soil, waste, and vent piping systems.
- D. PDI Compliance: Comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil, waste, and vent piping systems.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data for soil, waste, and vent piping systems materials and products.

PART 2 - PRODUCTS

2.1 SOIL, WASTE AND VENT PIPING MATERIALS AND PRODUCTS

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil, waste, and vent piping systems. Where more than one type of materials or product is indicated, selection is Installer's option.

2.2 BASIC PIPE, TUBE AND FITTINGS

- A. General: Provide pipe, tube, and fittings complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the Schedule on the Drawings.

2.3 BASIC HANGERS AND SUPPORTS

- A. General: Provide hangers and supports complying with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

2.4 DRAINAGE PIPING PRODUCTS

- A. General: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation

- requirements and governing regulations.
- B. Cleanout Plugs: Cast-bronze or brass, threaded, countersunk head.
 - C. Floor Cleanouts: Cast-iron body and frame; cleanout plug; adjustable round top as follows:
 - 1. Nickel-Bronze Top: Manufacturers standard cast unit of the pattern indicated:
 - a. Pattern: Exposed rim type, with recess to receive 1/8 inch thick resilient floor finish where applicable.
 - b. Pattern: Exposed rim type, with recess to receive 1 inch thick terrazzo floor finish where applicable.
 - c. Pattern: Exposed flush type, standard non-slip scored or abrasive finish.
 - d. Carpet Marker: Include approximately 1-1/4 inches diameter carpet marker for cleanouts that occur in carpeted areas.
 - D. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.
 - E. Flashing: As approved by metal roof manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF SOIL, WASTE AND VENT ABOVE GROUND PIPING

- A. General: Install soil, waste, and vent piping in accordance with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and with governing Plumbing Code.
- B. Flashing: Flash all vent penetrations through roofs as approved by roof manufacturer. Offset vents where necessary to provide 2 feet – 0 inches minimum clearance from other flashing such as outside walls, curbs, etc. All flashing shall be as approved by roofing manufacturer.

3.2 INSTALLATION OF BUILDING DRAIN PIPING

- A. General: Install underground building drains as indicated and in accordance with governing Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag-in-line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
- B. Install soil, waste and vent piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent) for piping 3 inches and smaller, and 1/8 inch per foot (1 percent) for piping 4 inches and larger.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

3.4 INSTALLATION OF DRAINAGE PIPING PRODUCTS

- A. Cleanouts: Install in sanitary aboveground piping and sanitary building drain piping as indicated, as required by governing Plumbing Code; and at each change in direction of piping greater than 45 degrees; at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish. Cleanouts shall be same size as pipe up to 4 inches and not less than 4 inches for larger pipe. All cleanouts shall be accessible. All cleanouts shall be opened, cleaned, and greased after all concrete work is completed.
- B. Outside cleanouts shall be brought up flush with finish grade or paving. Where at grade, they

shall be set in 14 inches x 14 inches x 5 inches concrete pads.

- C. Inside cleanouts shall be brought up flush with floors and provided with cleanout covers or in wall with wall cleanout cover.

3.5 EQUIPMENT CONNECTIONS

- A. Piping Runouts to Fixtures: Provide soil and waste piping runouts to equipment, plumbing fixtures, and drains with approved trap of sizes indicated; but in no case smaller than required by governing Plumbing Code. Comply with equipment manufacturer's instructions where not indicated otherwise.
- B. Rough-in and connect all kitchen equipment, including any interconnecting piping. Provide waste piping to drains and any required traps or fittings. Rough-in in accord with equipment suppliers rough-in drawings. Provide all waste and vent piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendation.

3.6 PIPING TESTS

- A. Test soil, waste, and vent piping system in accordance with requirements of governing Plumbing Code, but not less than 10 foot head water test.

END OF SECTION

FUEL GAS 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 DESCRIPTION OF WORK

- A. Extent of natural gas piping system work is indicated on Drawings and Schedules and by requirements of this Section.
- B. Applications for natural gas piping systems include the following:
 1. Gas service from street main or main on site to building meter.
 2. Building distribution system from gas meter to gas-fired equipment connections.
- C. Trenching and backfill required in conjunction with gas service piping is specified in applicable Division 2 Sections, and is included as work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of natural gas piping products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.
- B. Comply with NFPA 54 "National Fuel Gas Code" and International Fuel Gas Code for gas piping materials and components; installations; and inspection, testing, and purging.
- C. Local Utility Compliance: Comply with requirements of serving utility company.
- D. Local and State Codes: Comply with governing code and State Fire Marshal requirements.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data for gas piping systems materials and products.

PART 2 - PRODUCTS**2.1 NATURAL GAS PIPING MATERIALS AND PRODUCTS**

- A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.2 where applicable, base pressure rating on natural gas piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in natural gas piping systems. Where more than one type of materials or products are indicated, selection is Installer's option.

2.2 BASIC IDENTIFICATION

- A. General: Provide identification complying with Division 22 Section, "Mechanical Identification for Plumbing and HVAC," in accordance with the following listing:
 1. Gas Service: Underground detectable type plastic line markers.

2.3 BASIC PIPE, TUBE, AND FITTINGS

- A. General: Provide pipe, tube, and fittings complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the Schedule on Drawings.
- B. Gas Transition Fittings: Gas transition fittings shall be manufactured steel fittings approved

for jointing metallic and thermoplastic pipe. Approved transition fittings are those that conform to AGA-01 requirements for transitions fittings.

- C. Risers: A manufacturer's standard transition fitting, transition from plastic to plastic-coated steel pipe with O-ring seals and swaged gas-tight with metal insert. Provide manufacturer's standard protective sleeve.

2.4 BASIC HANGERS AND SUPPORTS

- A. General: Provide hangers and supports seals complying with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

2.5 VALVES

- A. General: Valves required for natural gas piping systems include the following types:
 - 1. Gas Cocks:
 - a. Gas Cocks 2 Inches and Smaller: 150 psi non-shock WOG, bronze straightway cock, flat or square head, threaded ends.
 - b. Gas Cocks 2-1/2 Inches and Larger: 125 psi non-shock WOG, iron body bronze mounted, straightway cock, square head, flanged ends.

2.6 PRESSURE REGULATORS

- A. General Requirements:
 - 1. Single-stage and suitable for natural gas.
 - 2. Steel jacket and corrosion-resistant components.
 - 3. Elevation compensator.
 - 4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2 1/2 (DN 65) and larger.
- B. Service Pressure Regulators: Comply with ANSI Z21.80.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Meter Company.
 - b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
 - 2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
 - 3. Springs: Zinc-plated steel; interchangeable.
 - 4. Diaphragm Plate: Zinc-plated steel.
 - 5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
 - 6. Orifice: Aluminum; interchangeable.
 - 7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon,
 - 8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulators.
 - 9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
 - 10. Overpressure Protection Device: Factory mounted on pressure regulator.
 - 11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
 - 12. Maximum Inlet Pressure: 100 psig.

PART 3 - EXECUTION

3.1 INSTALLATION OF BASIC IDENTIFICATION

- A. General: Install mechanical identification in accordance with Division 22 Section, "Mechanical Identification for Plumbing and HVAC."

3.2 INSTALLATION OF NATURAL GAS PIPING

- A. General: Install natural gas distribution piping in accordance with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and in accordance with applicable codes and serving utility company requirements. The contractor shall include all costs of metering, service lines and connections to serving utility distribution lines in his bid.
- B. Use sealants on metal gas piping threads which are chemically resistant to natural gas.

- Use sealants sparingly and apply to only male threads of metal joints.
- C. Remove cutting and threading burrs before assembling piping.
- D. Do not install defective piping or fittings. Do not use pipe with threads which are chipped, stripped, or damaged.
- E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation, and retain until continuing piping or equipment connections are completed.
- F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.
- G. Install drip-legs in gas piping where indicated, at equipment connections, and where required by code or regulation.
- H. Install "Tee" fitting with bottom outlet plugged or capped, at bottom of pipe risers.
- I. Use dielectric unions where dissimilar metals are joined together.
- J. Install piping with 1 inch drop in 60 degree pipe run (0.14 percent) in direction of flow.
- K. Install piping parallel.
- L. Do not install gas piping below floor slab or in unventilated concealed spaces. Provide protective metal sleeves for pipes passing through walls, floors, or partitions.
- M. Coordinate with gas utility company as necessary to interface gas piping with gas service supply work.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

3.4 INSTALLATION OF VALVES

- A. Gas Cocks: Provide at connection to gas train for each gas-fired equipment item; and on risers and branches where indicated.
- B. Locate gas cocks where easily accessible and where they will be protected from possible injury.

3.5 EQUIPMENT CONNECTIONS

- A. General: Connect gas piping to each gas-fired equipment item, with drip leg and shutoff gas cock. Comply with equipment manufacturer's instructions.

3.6 PIPING TESTS

- A. Test and purge natural gas piping in accordance with ANSI B31.2, and local utility requirements. Test at not less than 100 p.s.i.g. and prove tight for 2 hours.
- B. Repair or replace fuel gas piping as required to eliminate leaks and retest as specified to demonstrate compliance.

3.7 SPARE PARTS

- A. Furnish to Owner, with receipt, 2 valve wrenches for each type of gas valve installed, requiring same.

END OF SECTION

PLUMBING FIXTURES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 DESCRIPTION OF WORK

- A. Extent of plumbing fixtures and trim work is indicated by Drawings and Schedules, and by requirements of this Section.
- B. Types of plumbing fixtures required for the project are indicated by the Drawings and Schedules.
- C. Refer to Division 22 Sections for domestic water piping systems used in conjunction with plumbing fixtures; not work of this Section.
- D. Refer to Division 22 Sections for soil and waste piping systems used in conjunction with plumbing fixtures; not work of this Section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Provide products by one of the manufacturers listed in the Schedule on the Drawings or approved equivalent.
- B. Plumbing Fixture Standards: Comply with applicable portions of governing Plumbing Code pertaining to materials and installation of plumbing fixtures.
- C. Regulatory Requirements: Comply with requirements of CABO A117.1, "Accessible and Usable Buildings and Facilities;" Public Law 90-480, "Architectural Barriers Act;" and Public Law 101-336, "Americans with Disabilities Act;" regarding plumbing fixtures for physically handicapped people.
- D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers, and installation instructions.
- B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in maintenance manual.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.
- B. Handle plumbing fixtures carefully to prevent breakage, chipping, and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

PART 2 - PRODUCTS**2.1 PLUMBING FIXTURES**

- A. General: Provide factory-fabricated fixtures of type, style, and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing

regulations.

2.2 MATERIALS

- A. General: Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.
- B. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.
- C. Stainless Steel Sheets: Type 302/304, hardest workable temper.
 - 1. Finishes: No. 4, bright, directional polish on exposed surfaces.
- D. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes, and specks; glaze exposed surfaces.

2.3 PLUMBING FITTINGS, TRIM AND ACCESSORIES

- A. P-Traps: Include removable P-traps where drains are indicated for direct connection to drainage system.
- B. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations and within cabinets, provide chrome plated cast-brass escutcheons with set screw.
- C. Aerators: Provide aerators of types approved by Health Departments having jurisdiction.
- D. Comply with additional fixture requirements contained in fixture schedule on drawings.
- E. Floor Drains: Provide drains equivalent to that scheduled on drawings. Provide minimum top size of 5 inches for 2 inches size, 6 inches for 3 inches size, and 10 inches for 4 inches size. Include clamping ring for drains in waterproofed membrane floors. Provide drains with water passage size not smaller than outlet size.
- F. Trap Primer Valves: Refer to Division 22 Section, "Domestic Water

Piping." PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the governing Plumbing Code pertaining to installation of plumbing fixtures.
- C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within all construction so as to be rigid and not subject to pull or push movement. Secure with bolts full size of hanger drilling, through-wall where practicable, with back plates.
- D. Provide deep seal P-trap at each floor drain. In waterproofed, membrane floors, secure waterproofing with clamping ring.

3.2 CLEAN AND PROTECT

- A. Clean plumbing fixtures of dirt and debris upon completion of installation.
- B. Protect installed fixtures from damage during the remainder of the construction period.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. Test floor drains for free flow. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

- B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

END OF SECTION

TESTING, ADJUSTING, AND BALANCING**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 DESCRIPTION OF WORK

- A. The extent of test-adjust-balance (TAB) work is indicated by the requirements of this Section, and also by Drawings and Schedules, and is defined to include, but is not necessarily limited to, air distribution systems, and associated equipment and apparatus of HVAC work. The work consists of setting speed and volume (flow) adjusting facilities provided for the systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the work as required by the Contract Documents.
- B. The component types of testing, adjusting and balancing specified in this Section includes the following as applied to HVAC equipment:
 1. Packaged Rooftop Units
 2. Ductwork systems
 3. Grilles, registers, and diffusers
 4. Temperature controls

1.3 QUALITY ASSURANCE

- A. Installer: A TAB firm with at least 3 years of successful test-adjust-balance experience on projects with testing and balancing requirements similar to those required for this project who is not the Installer of system to be tested and is otherwise independent of the project.
- B. NEBB Compliance (Option): Comply with NEBB's "Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems" as applicable to HVAC air distribution systems and associated equipment and apparatus.
- C. AABC Compliance (Option): Comply with AABC's Pub. No. 12173, "National Standards for Field Measurements and Instrumentation, Total System Balanced", as applicable to HVAC air and hydronic distribution system and associated equipment and apparatus.
- D. Industry Standards: Comply with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) recommendations pertaining to measurements, instruments and testing, adjusting, and balancing, except as otherwise indicated.

1.4 SUBMITTALS

- A. Submit certified test report signed by the Test and Balance Supervisor who performed the TAB work.
- B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

1.5 JOB CONDITIONS

- A. Do not proceed with testing, adjusting, and balancing work until the work to be TAB'ed has been completed and is operable. Ensure that there is no latent residual work still to be completed.
- B. Do not proceed until the work scheduled for TAB'ing is clean and free from debris, dirt, and discarded building materials.

PART 2 - PRODUCTS**2.1 PATCHING MATERIALS**

- A. Except as otherwise indicated, use same products as used by original Installer for patching holes

in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

- B. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2.2 TEST INSTRUMENTS

- A. Utilize test instruments and equipment for the TAB work required, of the type, precision, and capacity as recommended in the following TAB standards:
 - 1. NEBB's Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems.
 - 2. AABC's National Standards for Field Measurements and Instrumentation, Total Balance System.

PART 3 - EXECUTION

3.1 GENERAL

- A. Tester must examine the installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Notify the Contractor in writing of conditions detrimental to the proper completion of the test-adjust-balance work.
- B. Do not proceed with the TAB work until unsatisfactory conditions have been corrected in a manner acceptable to the Tester.
- C. Test, adjust and balance the environmental systems and components, as indicated, in accordance with the procedures outlined in applicable standards. In addition perform the following:
 - 1. Test all safety devices for proper operation.
 - 2. Adjust gas burners and gas inputs per Manufacturer's recommendations.
 - 3. Calibrate temperature control systems and adjust heat anticipators per Manufacturer's recommendations.
 - 4. Test smoke detector as recommended by Manufacturer.
- D. Test, adjust and balance system during the summer for air conditioning systems and during winter for heating systems, including at least a period of operation at outside conditions within 5°F wet bulb temperature of maximum summer design condition, and within 10°F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring the final temperatures then take the final temperature readings when the seasonal operation does permit.
- E. Prepare report of test results, including instrumentation calibration reports, in format recommended by the applicable standards. In addition certify that safety devices have been checked and are operating properly, that gas inputs and gas burners have been adjusted in accord with manufacturer's recommendations that temperature control systems have been calibrated and are operating properly, that smoke detector is operating properly, and that heat anticipators have been adjusted in accord with manufacturer's recommendations.
- F. Patch holes in insulation, ductwork, and housings, which have been cut or drilled for test purposes, in a manner recommended by the original Installer.
- G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.
- H. Prepare a report of recommendations for correcting unsatisfactory HVAC performances when system cannot be successfully balanced.
- I. Retest, adjust, and balance system subsequent to significant system modifications or if report is unsatisfactory, and resubmit test results. Repeat until satisfactory results are obtained.

END OF SECTION

DUCT INSULATION**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 semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.
- B. Related Sections include Section 23 31 13, "Metal Ducts," for duct liner in double wall ducts.

1.3 SUBMITTALS

- A. Product Data: Identify thermal conductivity, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

1.4 DEFINITIONS

- A. IBC: International Building Code.
- B. IMC: International Mechanical Code.
- C. NFPA: National Fire Protection Association.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate clearance requirements with duct Installer for insulation application.

1.8 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products manufactured by companies regularly engaged in the manufacture of piping insulation products, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

2.3 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass- fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yards (270 g/sq. meters).
 - 1. Tape Width: 4 inches (100 mm).
- B. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
 - 1. Welded Pin Holding Capacity: 100 lb (45 kg) for direct pull perpendicular to the attached surface.
- C. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.
 - 1. Adhesive: Recommended by the anchor pin manufacturer as appropriate for surface temperatures of ducts, plenums, and breechings; and to achieve a holding capacity of 100 lb (45 kg) for direct pull perpendicular to the adhered surface.
- D. Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

2.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- 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 APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to the Schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Apply multiple layers of insulation with longitudinal and end seams staggered.
- E. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- F. Keep insulation materials dry during application and finishing.
- G. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints

with adhesive recommended by the insulation material manufacturer.

- H. Apply insulation with the least number of joints practical.
- I. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- J. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- K. Insulation Terminations: For insulation application where vapor retarders are indicated, seal ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
- L. Apply insulation with integral jackets as follows:
 - 1. Pull jacket tight and smooth.
 - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
 - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- M. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.
- N. Install vapor-retarder mastic on ducts and plenums scheduled to receive vapor retarders.
 - 1. Ducts with Vapor Retarders: Overlap insulation facing at seams and seal with vapor-retarder mastic and pressure-sensitive tape having same facing as insulation. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-retarder seal.
 - 2. Ducts without Vapor Retarders: Overlap insulation facing at seams and secure with outward clinching staples and pressure-sensitive tape having same facing as insulation.
- O. Wall Penetrations: Apply insulation for interior applications to a point even with face of interior wall or as necessary to double wall duct from the building exterior.
 - 1. Seal penetrations with vapor-retarder mastic.
 - 2. Apply insulation for exterior applications tightly joined to interior insulation ends.
 - 3. Seal insulation to wall flashing with vapor-retarder mastic.
- P. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- Q. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.
- R. Floor Penetrations: Terminate insulation at underside of floor assembly and at floor support at top of floor.
 - 1. For insulation indicated to have vapor retarders, taper termination and seal insulation ends with vapor-retarder mastic.

3.4 MINERAL-FIBER INSULATION APPLICATION

- A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with anchor pins and speed washers.
 - 1. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions larger than 18 inches (450 mm). Space maximum 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - b. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - c. Do not over compress insulation during installation.
 - 2. Impale insulation over anchors and attach speed washers.
 - 3. 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. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to

- adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
 5. Overlap unfaced blankets a minimum of 2 inches (50 mm) on longitudinal seams and end joints. Secure with steel band at end joints and spaced a maximum of 18 inches (450 mm) o.c.
 6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply 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 the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
 8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.
 9. Provide 6 inch wide continuous strip of 2 inch thick rigid insulation at trapeze hangers. Attach to duct with adhesive.
 - B. Board Applications for Ducts and Plenums: Secure board insulation with adhesive and anchor pins and speed washers.
 1. Apply adhesives according to manufacturer's recommended coverage rates per square foot.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Space anchor pins as follows:
 - a. On duct sides with dimensions larger than 18 inches (450 mm). Space maximum 16 inches (400 mm) o.c. each way, and 3 inches (75 mm) maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
 - b. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - c. Do not over compress insulation during installation.
 4. 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.
 5. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches (50 mm) from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2 inch (13 mm) staples, 1 inch (25 mm) o.c., and cover with pressure-sensitive tape having same facing as insulation.
 6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply 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 the insulation surface with 6 inch (150 mm) wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches (150 mm) o.c.
 8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.
- 3.5 DUCT SYSTEM APPLICATIONS
- A. Insulation materials and thicknesses are specified in schedules at the end of this Section.
 - B. Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.
 - C. Insulate the following plenums and duct systems:
 1. Indoor concealed supply-, return-, and outside-air ductwork.
 2. Indoor exposed supply-, return-, and outside-air ductwork.
 - D. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
 1. Factory-insulated flexible ducts.
 2. Factory-insulated plenums, casings, and filter boxes and sections.
 3. Flexible connectors.

4. Vibration-control devices.
5. Testing agency labels and stamps.
6. Nameplates and data plates.
7. Double wall access panels and doors in air-distribution systems.

3.6 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

- A. Service: Supply-, return-, and outside-air ducts, concealed and backs of supply air diffusers.
 1. Material: Mineral-fiber blanket.
 2. Thickness: 2 inches (50 mm).
 3. Number of Layers: One.
 4. Field-Applied Jacket: No.
 5. Vapor Retarder Required: Yes.
- B. Service: Rectangular, supply-, return-, and outside-air ducts, exposed.
 1. Material: Mineral-fiber board.
 2. Thickness: 1 inch (25 mm).
 3. Number of Layers: One.
 4. Field-Applied Jacket: PVC.
 5. Vapor Retarder Required: Yes.

3.7 OUTDOOR DUCT AND PLENUM APPLICATION SCHEDULE

- A. Service: Supply and return ducts exposed.
 1. Material: Mineral fiber board.
 2. Minimum R value of 8.0 °F · ft² · h/BTU.
 - a. Provide multiple layers of insulation as required to meet or exceed the required R value.
 - b. Stagger seams between layers.
 3. Field-Applied Jacket: Rubberized Bituminous resin on cross laminated film with white aluminum foil facing.
 4. Vapor Barrier Required: Yes.

END OF SECTION

CONDENSATE DRAIN PIPING**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 piping for drain lines and condensate drain piping.
- B. Related Sections include the following:
 - 1. Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" for general piping materials and installation requirements.
 - 2. Division 22 Section, "Hangers and Supports for Plumbing and HVAC" for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.

1.3 COORDINATION

- A. Coordinate layout and installation of drain piping and suspension system components with other construction, including natural gas piping system.
- B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS**2.1 PIPING MATERIALS**

- A. General: Refer to Piping and Fitting Material Schedule on the drawings for applications of pipe and fitting materials.

PART 3 - EXECUTION**3.1 PIPING INSTALLATIONS**

- A. Refer to Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" for basic piping installation requirements.
- B. Install drains, consisting of a tee fitting, threaded nipple with threaded cap for system cleanout. Provide cleanout at each change in direction and at connection to unit.
- C. Install piping at a uniform grade of 0.2 percent downward in direction of flow.
- D. Increase/reduce pipe sizes using eccentric reducer fitting installed with level side down.
- E. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe.

3.2 HANGERS AND SUPPORTS

- A. Supports are specified in Division 22 Section, "Hangers and Supports for Plumbing and HVAC".
- B. Install supports for condensate piping with continuous slope from unit connection to drain line termination.

3.3 PIPE JOINT CONSTRUCTION

- A. Refer to Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" and schedule on the drawings for joint construction requirements for soldered and brazed joints in copper tubing.

3.4 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for piping connections shall be same as for equipment connections. Increase pipe size at connection as indicated on drawings.

- 3.5 CLEANING
- A. Flush drain piping systems with clean water.

END OF SECTION

METAL DUCTS**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 metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 7 to plus 10 inch wg (minus 1750 to plus 2500 Pa). Metal ducts include the following:
 1. Rectangular ducts and fittings.
 2. Single-wall and double wall, round spiral-seam ducts and formed fittings.
 3. Double-wall, rectangular ducts and fittings.
 4. Duct liner.
 5. Factory fabricated stainless steel supply air duct.

- B. Related Sections include Division 23 Section 23 30 00, "Ductwork Accessories," for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air moving and distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.
- B. Ducts shall be single-wall except where indicated to be double-wall on the Drawings.

1.4 SUBMITTALS

- A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot (1:50) scale. Show fabrication and installation details for metal ducts.
 1. Duct layout indicating sizes and pressure classes.
 2. Elevations of top and bottom of ducts.
 3. Fittings.
 4. Reinforcement and spacing.
 5. Seam and joint construction.
 6. Penetrations through fire-rated and other partitions.
 7. Equipment installation based on equipment being used on Project.
 8. Duct accessories, including access doors and panels.
 9. Hangers and supports, including methods for duct and building attachment. Field quality-control test reports.
- B.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. Codes and Standards:
 1. SMACNA Standards: "HVAC Duct Construction Standards, Metal and Flexible."
 2. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 3. International Mechanical Code.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

- 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.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 (Z180) coating designation and G90 for ducts located on building exterior. Ducts shall have mill- phosphatized finish for surfaces exposed to view.
- C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.
- D. Stainless Steel: ASTM A 480/A 480M, Type 304, and having a No. 2D finish for concealed ducts and No. 4 finish for exposed ducts.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 DUCT LINER FOR DOUBLE WALL DUCTWORK

- A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
 - 1. Materials: ASTM C 1071.
 - a. Thickness: 1 inch (25 mm).
 - b. Thermal Conductivity (k-Value): 0.26 at 75 degrees F (0.037 at 24 degrees C) mean temperature.
 - c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 2. Tensile Strength: Indefinitely sustain a 50 lb (23 kg) tensile, dead-load test perpendicular to duct wall.
 - 3. Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
 - 4. Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.3 SEALANT MATERIALS

- A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.
- B. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber-reinforced fabric.
- C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 - 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
 - 1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or

- galvanized rods with threads painted with zinc-chromate primer after installation.
- 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
- 3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc- chromate primer.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
- 2.5 RECTANGULAR DUCT FABRICATION
 - A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - 1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 - 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
 - B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, joint reinforcement and gasket material.
 - 1. Ductmate industries, inc.
 - 2. Lindab, Inc.
 - C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
 - 1. Duct Size: Maximum 30 inches (750 mm) wide and up to 2 inch wg (500 Pa) pressure class.
 - 2. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
 - D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. feet (0.93 sq. meter) of nonbraced panel area unless ducts are lined.
- 2.6 APPLICATION OF LINER IN DOUBLE WALL RECTANGULAR DUCTS
 - A. Adhere single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - C. Butt transverse joints without gaps and coat joint with adhesive.
 - D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 - E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
 - F. Apply adhesive coating on longitudinal seams.
 - G. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
 - H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - 1. Fan discharges.
 - 2. Intervals of lined duct preceding unlined duct.
 - 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.
 - I. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer

shell without compressing insulation.

1. Sheet Metal Inner Duct Perforations: 3/32 inch (2.4 mm) diameter, with an overall open area of 23 percent.

J. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 ROUND DUCT AND FITTING FABRICATION

A. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

1. Manufacturers:

- a. Dixie Sheet Metal Works – Falls Church, VA
- b. Duct Direct – Houston, TX
- c. Eastern Sheet Metal
- d. Graco Metals
- e. Hamlin Sheet Metal
- f. Mason Road Sheet Metal
- g. McGill Airflow Corporation
- h. SEMCO Incorporated
- i. Spiral Pipe of Texas
- j. Spiral Systems, Inc.

B. Duct Joints:

1. Ducts up to 20 Inches (500 mm) in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
2. Ducts 21 to 72 Inches (535 to 1830 mm) in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
3. Round Ducts and exterior rectangular: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
 - a. Manufacturers:
 - 1) Ductmate Industries, Inc.
 - 2) Lindab Inc.

C. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.

D. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.

E. Fabricate elbows using die-formed or mitered construction. Bend radius of die-formed shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:

1. Mitered-Elbow Radius and Number of Pieces: Continuously welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
2. Round Mitered Elbows: Continuously welded construction with the following metal thickness for pressure classes from minus 2 to plus 2 inch wg (minus 500 to plus 500 Pa):
 - a. Ducts 3 to 36 Inches (75 to 915 mm) in Diameter: 0.034 inch (0.85 mm).
3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2 to 10 inch wg (500 to 2500 Pa):
 - a. Ducts 3 to 26 Inches (75 to 660 mm) in Diameter: 0.034 inch (0.85 mm).
 - b. Ducts 27 to 50 Inches (685 to 1270 mm) in Diameter: 0.040 inch (1.0 mm).
4. Round Elbows 8 Inches (200 mm) and Less in Diameter: Fabricate die-formed elbows for 45 and 90 degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
5. Round Elbows Larger than 9 Inches in Diameter: Fabricate mitered elbows for 30, 45, 60, and 90 degrees.
6. Die-Formed Elbows for Sizes through 8 Inches (200 mm) in Diameter and All Pressures

0.040 inch (1.0 mm) thick with 2-piece welded construction.

2.8 DOUBLE-WALL DUCT AND FITTING FABRICATION

- A. Ducts: Fabricate rectangular and round double-wall (insulated) ducts with an outer shell and an inner duct. Dimensions indicated are for inner ducts.
 - 1. Outer Shell: Base metal thickness on outer-shell dimensions. Fabricate outer-shell lengths 2 inches (50 mm) longer than inner duct and insulation and in metal thickness specified for single-wall duct.
 - 2. Insulation: Fibrous glass, unless otherwise indicated. Terminate insulation where double-wall duct connects to single-wall duct or uninsulated components, and reduce outer shell diameter to inner duct diameter.
 - a. Provide insulation to meet the following minimum R-Values.
 - 1) Exterior Supply and Return ducts: 6.0
 - 2) Interior Supply and Return ducts concealed: 6.0
 - 3) Interior Supply ducts exposed: 6.0
 - 4) Interior Return ducts exposed: 3.5
 - 3. Perforated Inner Ducts: Fabricate with 0.028 inch (0.7 mm) thick sheet metal having 3/32 inch (2.4 mm) diameter perforations, with overall open area of 23 percent. Provide mylar liner and construct to separate fiber glass from airstream and prevent erosion of fiber glass into air stream.
 - 4. Maintain separation of inner duct to outer shell by mechanical means. Prevent dislocation of insulation by mechanical means.
- B. Fittings: Fabricate double-wall (insulated) fittings with an outer shell and an inner duct.
 - 1. Perforated Inner Ducts: Fabricate with sheet metal having 3/32 inch (2.4 mm) diameter perforations, with overall open area of 23 percent. Gauge of inner duct shall be same as outer duct. Provide mylar liner and construct to separate fiber glass from airstream and prevent erosion of fiber glass into air stream.

2.9 FACTORY FABRICATED STAINLESS STEEL SUPPLY AIR DUCT (ROUND DUCT ONLY WHERE EXPOSED)

- A. Factory designed and built single or double wall stainless steel supply duct, with laser cut openings for uniform air distribution; for heating and cooling operation.
- B. Construct ductwork of stainless-steel sections.
- C. Where double wall ductwork is indicated, provide formaldehyde free fiberglass insulation with FSK jacket between inner and outer layers.
- D. Provide all gaskets and stainless-steel hardware required for field assembly of ductwork sections.
- E. Factory fabricated supply duct shall have a 20-year manufacturer's warranty.
- F. Manufacturers provide one of the following as an alternative to exposed spiral seam round ductwork.
 - 1. CaptiveAire, Air Diffusion Supply

Duct PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

- A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
 - 1. Supply Ducts: Low pressure, 2 inch wg (500 Pa).
 - 2. Supply Ducts: Medium/high pressure 5 inch wg (1250 Pa).
 - 3. Return Ducts (Negative Pressure): 1 inch wg (250 Pa).
 - 4. Exhaust Ducts (Negative Pressure): 2 inch wg (500 Pa).

3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards-- Metal and Flexible," unless otherwise indicated.
- B. Install round and flat-oval ducts in lengths not less than 12 feet (3.7 meters) unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure

couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.

- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
 - G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
 - H. Exposed supply air/return air duct shall be sealed from dust and debris during storage and after installation.
 - I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.
 - J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
 - K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
 - L. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
 - M. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
 - N. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).
 - O. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section 23 33 00, "Ductwork Accessories."
 - P. Roofs: Where ducts are located on roofs, provide G90 sheet metal shields over top and vertical sides of all duct joints. Solder all seams in joint shields and seal to exterior duct layer for watertight ductwork. Provide roof supports as indicated.
 - Q. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
 - R. Install double wall ducts from the VAV air unit supply outlet and return air inlet down to below the third floor ceiling.
 - S. Install factory fabricated ducts per the manufacturer's installation instructions.
- 3.3 SEAM AND JOINT SEALING
- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
 - 1. For pressure classes lower than 2 inch wg (500 Pa), seal transverse joints.
 - B. Seal and test ducts before external insulation is applied.
 - C. Test ducts in accordance with SMACNA. Make necessary repairs to sustain test pressure with not more than 5 percent leakage.
- 3.4 HANGING AND SUPPORTING
- A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
 - B. Support vertical ducts at maximum intervals of 16 feet (5 meters) and at each floor.
 - C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof- test) load.
- 3.5 CONNECTIONS
- A. Make connections to equipment with flexible connectors according to Division 23 Section 23 33 00, "Ductwork Accessories."
 - B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

END OF SECTION

DUCTWORK ACCESSORIES**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of ductwork accessories work is indicated on drawings and in schedules and by requirements of this section.
- B. Types of ductwork accessories required for project include the following:
 - 1. Low pressure manual dampers.
 - 2. Turning vanes.
 - 3. Duct hardware.
 - 4. Duct access doors.
 - 5. Flexible connections.
 - 6. Flexible ducts.
- C. Refer to other Division 23 Sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.

1.3 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible."
 - 2. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction and installation instructions.
- B. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data and product data in maintenance manual; in accordance with requirements of Division 1 and Division 22 Section 22 05 00, "Basic Mechanical Materials and Methods for Plumbing and HVAC".

PART 2 - PRODUCTS**2.1 DAMPERS**

- A. Low Pressure Manual Dampers: Provide manual volume dampers constructed of galvanized steel.
 - 1. Square and Rectangular Dampers: Dampers shall have minimum 16 gauge frames and minimum 16 gauge roll formed blades. Multi-blade dampers shall have interlocking corrugated edges. Damper linkage shall be concealed in the damper frame. Dampers for ducts smaller than 10 inches by 10 inches may be single blade dampers, all other dampers shall have multiple blades. Provide opposed blade type unless indicated otherwise.
 - 2. Round Dampers: Dampers shall be minimum 20 gauge frame and 20 gauge blade. Blade shall be secured to 3/8" square or 1/2" diameter galvanized or plated axle/shaft that extends beyond frame through bearings and locking hand quadrant.
 - 3. Dampers shall include permanently lubricated oilite bronze bearings pressed securely

into damper frame.

4. Dampers shall include factory furnished locking quadrants with 2" elevated dial and "OPEN" and "CLOSED" indicators.
- B. Manufacturer: Subject to compliance with requirements, provide balancing dampers of one of the following or approved equivalent:

	<u>Single Blade</u>	<u>Opposed Blade</u>	<u>Parallel Blade</u>	<u>Round Blade</u>
1. Ruskin	MD35	MD35	MD35	MDRS25
2. Air Balance, Inc.	AC-1	AC-2	AC-1	AC-530
3. Greenheck	MBD-15	MBD-15	MBD-15	MBDR-50
4. American Warming and Ventilating	VC-1	VC-2	VC-2	VC-25
5. Safe-Air	612	610	611	BDR
6. PoHorf	CD10	CD425	CD10	CD10R
7. Nailor	1870	1820	1810	1890
8. NCA Manufacturing	MBD-57	MBD-57	MBD-57	MBD-RD-88

2.2 TURNING VANES

- A. Fabricated Turning Vanes: Provide fabricated turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".

2.3 DUCT HARDWARE

- A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
 1. Test Holes: Provide in ductwork at fan inlet and outlet and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
 2. Quadrant Locks: Provide quadrant lock device on one end of shaft and end bearing plate on other end for damper lengths over 12". Provide 2" extended quadrant locks and 2" end extended bearing plates for externally insulated ductwork.
 - 1) Duro-dyne, Model 8021.
 - 2) Young, Model 443B/404B.
 3. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.
 - 1) Duro-dyne, Model 8009.
 - 2) Young, Model 301/315.
- B. Spin-In Fittings:
 1. Flexmaster U.S.A., Inc., Model CB.
 2. Sheet Metal Connectors, Inc., Model G.
 3. M & M Manufacturing, Model 50.
- C. High Efficiency Takeoffs (Rectangular Tap with Transition to Round Branch):
 1. Sheet Metal Connectors, Inc., Model HET (24 gage.).
 2. Field fabricated as detailed on the drawings.
 3. Dace, Model STO.

2.4 DUCT ACCESS DOORS

- A. General: Provide where indicated, duct access doors of size indicated.
- B. Construction: Construct of same or greater gage as ductwork served; provide insulated doors for insulated ductwork with minimum 1 inch insulation (k -value = 0.26 at 75 degrees F mean temperature sandwiched between sheetmetal panels. Provide flush frames for uninsulated ductwork; extended frames for externally insulated duct. Provide one side hinged, other side with one handle-type latch for doors 12 inches high and smaller, 2 handle-type latches for larger doors. Screwdriver operated latches are not acceptable

2.5 FLEXIBLE CONNECTIONS

- A. Provide flexible duct connections wherever ductwork connects to HVAC equipment, fans or other vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.

2.6 FLEXIBLE DUCTS

- A. Manufacturers:
 - 1. Flexmaster U.S.A., Inc.
 - 2. Hart & Cooley, Inc.
 - 3. McGill AirFlow Corporation.
 - 4. Thermaflex.
- B. Insulated-Duct Connectors: UL 181, Class 1, liner of multiple layers of aluminum laminate supported by helically wound, galvanized or coated spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.
 - 1. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - 2. Rated Air Velocity: 4000 fpm (20.3 m/s).
 - 3. Temperature Range: Minus 20 to plus 210 degrees F (Minus 28 to plus 99 degrees C).
 - 4. Flame Spread: Less than 25.
 - 5. Smoke Developed: Less than 50.
 - 6. Thermal Conductance: C Factor not more than 0.23.
- C. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm- gear action, in sizes to suit duct size.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Where ducts take off mains, and where ducts divide, install splitter dampers or volume dampers, each with adjustable locking quadrant control. Provide volume damper unless splitter damper is indicated. Provide adjustable pivoting splitter with locking quadrant control for all splitter dampers. Provide a volume damper after each splitter damper, located in the branch with the lowest resistance.
- C. Concealed dampers that are not accessible shall be controlled by a concealed regulator, type as indicated. Where type is not indicated, provide type as recommended by manufacturer for application. Include flush chrome plated access panel for each.
- D. Install turning vanes in all square or rectangular 90° elbows in supply, return, and exhaust air systems, and elsewhere as indicated.
- E. Install access doors to open against system air pressure, with latches operable from either side.
- F. Install flexible ducts only where indicated and only in extended straight lengths not to exceed 36 inches; bends, sags or elbows will not be permitted.
- G. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 FIELD QUALITY CONTROL

- A. Operate installed ductwork accessories to demonstrate compliance with requirements. Test for

air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leak proof performance.

3.4 ADJUSTING AND CLEANING

- A. Adjusting: Adjust ductwork accessories for proper settings, install fusible links in fire dampers, and adjust for proper action.
- B. Final positioning of manual dampers is specified in Section 23 05 93 "Test, Adjust, and Balance".
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

DIFFUSERS, REGISTERS, AND GRILLES**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 ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 SUBMITTALS

- A. Product Data: For each product indicated, include the following:
 - 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, Register, and Grille Schedule: Indicate model number and accessories furnished.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. The following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products scheduled on the drawings.

2.2 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles 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, registers, and grilles are to be 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, registers, and grilles 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 practicable. 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, registers, and grilles 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, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

AIR IONIZATION SYSTEMS**PART 1 - GENERAL****1.1 GENERAL PROVISIONS**

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:
 1. Performance and design criteria for air ionization systems.
 2. Needlepoint Bipolar Ionization (NPBITM) System Components:
 - a. Non-Auto Cleaning - AC Voltage Output:
 - 1) Modular air ionization system.
 - b. Non-Auto-Cleaning - DC Voltage Output:
 - 1) Flexible ion strip air ionization device, 18 inches (457 mm) long.
 - 2) Flexible ion strip air ionization device, 36 inches (914 mm) long.
 - 3) Needlepoint bipolar air ionization device with BAS alarm contacts.
 - c. Auto-Cleaning - DC Voltage Output.
 - 1) Auto-cleaning needlepoint bipolar ionization system. Up to 2,400 CFM of 6 tons per device.
 - 2) Auto-cleaning needlepoint bipolar ionization system. Up to 4,800 CFM or 12 tons per device.
 - 3) Auto-cleaning needlepoint bipolar ionization devices.

1.3 RELATED WORK

- A. The following items are not included in this Section and are specified under the designated Sections:
 1. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 2. Section 23 09 23 - Building Management and Control System
 3. Section 23 23 03 - Refrigerant Piping.
 4. Section 23 31 13 - Metal Ducts
 5. Section 23 33 00 - Ductwork Accessories.
 6. Section 26 05 00 - Common Work Results for Electrical; Electrical Wiring.
 7. Section 26 05 23 - Control-Voltage Electrical Power Cables; Control Wiring.

1.4 REFERENCED CODES and STANDARDS

- A. The following codes and standards are referenced throughout. The edition used is that currently enforced by authorities having jurisdiction (AHJ) at the Project's location. In absence of such direction then as referenced by the current enforceable IBC code or as indicated in the Contract Documents, except where specifically referenced.
 1. ASHRAE Standards 62.1.
 2. National Electric Code NFPA 70.
 3. UL 867 for electrical safety.
 4. UL 2998 Certification - Zero Ozone Emissions - as required by ASHRAE 62.1-2019.

1.5 DEFINITIONS

- A. NPBI - Needlepoint bipolar ionization system

1.6 ACTION SUBMITTALS

- A. Product Data: For each product. Include dimensions; operating characteristics; required clearances and access; rated capacity; fire classification; furnished specialties; and accessories as indicated.
- B. Product Data: Manufacturer's technical product data for ionization systems.
 1. Schedule of ionization systems indicating unit designation, number of each type required for each unit/application.
 2. Data sheet for each ionization system type, and accessories furnished. Indicate construction, sizes, and mounting details.

3. Ion performance data for each type of ionization device furnished.
 4. Product drawings detailing physical, electrical and control requirements.
 5. Proof of Compliance with UL-2998: Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners
 - a. Certificates must be listed on either of the following websites.
 - 1) <https://spot.ul.com/>.
 - 2) <https://sustainabilitydirectory.intertek.com/home>.
 - C. Shop Drawings: For each Needlepoint Bipolar Ionization (NPBI™) device.
 1. Include plans, elevations, sections, details, and attachments to other work.
 2. Show assembly, dimensions, materials, and methods of assembly of components.
 3. Include setting drawings, templates, and requirements for installing.
 4. Include diagrams for power, signal, and control wiring.
 - D. Operating and Maintenance Data:
 1. Submit O&M data and recommended spare parts lists. Include 10 years of operations and energy costs.
- 1.7 INFORMATIONAL SUBMITTALS
- A. Product Test Reports: Ion performance for each type of Needlepoint Bipolar Ionization (NPBI™) system as detailed in this specification.
 - B. Field Quality-Control Reports.
- 1.8 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For each type of Needlepoint Bipolar Ionization (NPBI™) system.
- 1.9 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Company who specializes in manufacturing products specified in this section. Documented Experience: 10 years.
 1. A qualified representative of the manufacturer shall be available to inspect the installation of the air ionization system to ensure installation in accordance with manufacturer's recommendation.
- 1.10 PRODUCT DELIVERY, STORAGE AND HANDLING
- A. Delivery: In factory fabricated shipping containers.
 1. Identify on outside of container type of product and location to be installed.
 2. Avoid crushing or bending.
 - B. Storage: In original cartons and protect from weather and construction work traffic.
 1. Store indoors and in accordance with the manufacturers' recommendation for storage.
- 1.11 WARRANTY
- A. Equipment is warranted by the manufacturer against defects in material and workmanship for a period of THREE years after shipment.
 1. Labor to replace equipment under warranty: Provided by Owner or installing contractor.
 2. Warranty will be for full replacement within three-year period and not prorated.

PART 2 - PRODUCTS

- 2.1 MANUFACTURER
- A. Provide Products manufactured by the following:
 1. Global Plasma Solutions.
 - B. Substitutions: In accordance with provisions in Section 01 60 00.
 1. It is the responsibility of manufactures to confirm non-infringement on intellectual property.
- 2.2 PERFORMANCE AND DESIGN CRITERIA FOR AIR IONIZATION SYSTEMS
- A. Each piece of air handling equipment, so designated on the plans, details, equipment schedules and/or specifications shall contain a Needlepoint Bipolar Ionization (NPBI™) system with output as described here within.
 - B. Project Design:
 1. If using ASHRAE Standard 62.1 - IAQP: IAQ Procedure requires a qualified Designer or Engineer to provide Indoor Air Quality calculations using formulas within ASHRAE Standard 62.1 to validate acceptable indoor air quality at the quantity of outside air

- scheduled with the technology submitted.
- 2. Unacceptable Technologies:
 - a. Powered particulate filters.
 - b. Polarized media filter.
 - c. Uni-polar ion generators.
 - d. "Plasma" particulate filters.
 - e. High-powered ionization devices.
 - f. Ozone generators.
 - g. Photocatalytic Oxidation (PCO) products.
 - h. Dry hydrogen peroxide products.
- C. Maximum Ozone Emissions per UL 2998:
 - 1. Not Acceptable: Products not certified to UL2998 - Environmental Claim Validation Procedure for Zero Ozone Emissions.
- D. All devices shall be listed on the UL SPOT environmental claim validation website, or the Intertek Sustainability Certification Directory website, proving compliance to UL 2998.
 - 1. Test result reports must be available from Manufacturer upon request.
 - 2. Not Acceptable: Products not listed on either of these websites are not acceptable.
- E. Humidity: Ionization devices do not require preheat protection when relative humidity of entering air exceeds 85 percent. Relative humidity from 0 to 100 percent, condensing, will not cause damage, deterioration, or dangerous conditions within the air ionization system.
- F. Ionization Requirements: Installed as indicated on the Drawings or as specified.
 - 1. Ionization Output: Positive and negative ions shall be produced. Unipolar ionization devices are not acceptable. Output varies from product to product. See specific product specification information for total ion output.
 - a. Ion Output: Ions per cubic centimeter when tested at 1 inch (25 mm) from the ionization system.
 - 1) Manufacturers showing ion output in ions/cc/sec must convert to ions/cc as measured 1 inch (25 mm) from the electrodes without airflow and provide that data during the submittal process. Ion meters measure in ions/cc not ions/cc/sec and these values are required for field verification during commissioning.
- G. NPBI™ Components:
 - 1. Tested by UL or Intertek proving conformance to UL 2998 Third Edition (2020) ozone standard when tested using UL 867 Fifth Edition (2011) methodology. Testing must be large chamber environment testing and peak ozone test for electronic devices in accordance with the standard.
 - a. Submit independent UL 867 test data with ozone results to Engineer of Record during submittal process.
 - b. Components achieving UL 867 prior to December 21, 2007, were not tested with the ozone amendment and are not acceptable for consideration.
 - c. Increasing interior ion concentration levels, both positive and negative collectively, to a minimum of 2000 ions/cc measured 5 ft (1524 mm) from floor where air is delivered from the duct system.
 - d. Produce positive and negative ions.
 - 1) Not Acceptable: Uni-polar ion devices.
 - e. Air exchange rates may vary through the full operating range of a constant volume or variable air volume (VAV) system. The quantity of air exchange must not be increased due to requirements of the air ionization system.
 - f. Velocity Profile: Maintain minimum air velocity of 300 feet per minute (FPM). Air ionization devices do not have maximum velocity profiles.
- H. Ion Systems: General.
 - 1. Ionization Devices Enclosures: Non-metallic materials for corrosion prevention and thermal bridging.
 - 2. UL 2998 Environmental Claim Validation Procedure for Zero Ozone Emissions from Air Cleaners certification is required. No exceptions.
 - 3. Integral Alarm Dry Contacts: For connection to BAS to prove ionization system is receiving adequate input power.
 - 4. Capable of operating in 100 percent relative humidity conditions, without damage.
 - 5. No maximum velocity limitation.
 - 6. Mounting: Magnets or self-tapping sheet metal screws.

- I. Design Requirements for Non-Coil Cleaning Installations:
 1. Installations must include the required number of electrodes and power generators sized to the air handling equipment capacity.
 2. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Carbon fiber clusters must contain a minimum of 45,000 needles.
 - a. Not Acceptable: titanium, stainless or any other metal.
 - b. Not Acceptable: Bipolar ionization tubes manufactured of glass, composite, mica, or similar dielectric materials.
 - c. Energize when main unit disconnect is turned on and fan is operating.
 - 1) Not Acceptable: Ionization systems requiring mechanical air pressure switches to cycle electrodes when fan is operating.
 - d. Electrode Pair: Provide electrodes to generate both positive and negative ions.
 - e. Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.
 - 1) Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning
 3. Multi-Voltage Input: 24V to 240V AC or DC or 24V or 110 to 240V AC or DC.
 4. Magnets for mounting to fan inlet.
 5. Auto-Cleaning Mechanisms: Mechanical friction auto-cleaning systems to ensure needle tips are properly cleaned.
 - a. Not Acceptable: Systems using vibration, high frequency or plunging action as a means of auto-cleaning.
- J. Design Requirements for Coil Cleaning Installations: GPS-iMOD®
 1. NPBI™ Electrodes: Made from carbon fiber to prevent oxidation over time. Not Acceptable: titanium, stainless or any other metal.
 - a. Provided in 6 inch (152 mm) sections for field assembly by installer. Assemble such that entire finned width of the coil is covered.
 - b. One modular ionization bar for every 5 ft (1524 mm) of coil height.
 - c. Electrode Spacing: 0.5 inch (13 mm) apart.
 - 1) Not Acceptable: Ionization Bars with ion output spaced greater than 1 inch (25 mm) apart.
 - d. Output: A minimum of 140M ions/cc per inch of bar measured 1 inch (25 mm) from carbon fiber brushes.
 - e. Ionization Bars: Provided with separate power supply capable of powering up to 4 ionization bars requiring no more than 20 watts of power up to a total connected bar length of 48 ft (14.63 m). Single bar length limit is 12 feet.
 - 1) The ionization bars and power supply to be alternating current output.
 - 2) Provided with an on/off switch with LED light.
 - 3) BAS interface capable using dry alarm contacts.
 - f. AC Output Power Supply: Accept 24 VAC, 110 VAC or 208 to 240VAC input.
 2. NEMA 4 Enclosure: For external power mounts.
- K. Electrical Requirements: Wiring, conduit, and junction boxes.
 1. Installed within housing plenums in accordance with NEC NFPA 70.
 2. NPBI™ Units: Accept electrical service of 24 VAC to 240 VAC, universal 2 wire input, 1 phase, 50/60 Hz.
 3. Coordinate electrical requirements with air ionization device manufacturer during submittals.
- L. Control Requirements:
 1. NPBI™ Devices:
 - a. Internal short circuit protection.
 - b. Overload protection.
 - c. Automatic fault reset circuit breakers.
 - d. Capable of interfacing with the BAS system.
 - 1) Provide dry contacts to prove the unit is receiving adequate input power.
 - e. Not Acceptable: Manual fuses.
 2. Ionization output: Varies as airflow velocity changes.
 - a. Not Acceptable: Mechanical airflow switch to activate NPBI™ devices, due to high failure rates and possible pressure reversal.
 3. Mount and wire NPBI™ devices within air handling units specified or as shown on the Drawings. Follow manufacturer IOM instructions during installation.

- A. Product: GPS-iMOD[®]. Modular Bipolar Ionization Device. Made of composite and carbon fiber. Handles 50 to 250 CFM per inch of bar. Voltage selector switch, illuminated On/Off switch, operation status LED, six HV output ports, integral Building Automation System (BAS) alarm contacts, auxiliary terminals for connection of an optional GPS-iDETECT-PTM Ion Sensor. GPS-iMOD[®] Bar: 6 inch (152 mm) Sections, nine brushes per section, up to 144 inch (3658 mm) total length, with rare earth magnets for easy spacing and mounting.
1. Electrical Listings: UL, cUL.
 2. Standards Compliance: UL 2998, UL 867, IAQP, OSHPD Seismic (OSP), CE, CARB.
 3. Input Voltage: 24/120/208-240 VAC.
 4. Amps: 0.500 A/0.120 A/0.065 A.
 5. Frequency: 50/60 Hz.
 6. Output Voltage: 5 kV RMS.
 7. Output Frequency: 50/60 Hz.
 8. Total Ion Output: Greater than 140M ions/cc per inch of bar.
 9. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
 10. Relative Humidity Range: 0 to 100 percent.
 11. Power Entry: UL Listed, line cord with 3-prong plug.
 12. Power Unit Dimensions (LxWxH): 9.00 x 3.25 x 4.75 inches (229 x 83 x 121 mm).
 13. Ionizer Bar Dimensions (HxW): 1.6 x 0.75 inches (41 x 19 mm).
 - a. Length per Section: 6.0 inches (152 mm). Plus 1.2 inches (30.5 mm).
 - b. Maximum Length: 144 inches (3658 mm)
 14. Power Unit Weight: 4.63 lbs (2.1 kg).
 15. Ionizer Bar Weight: 0.24 lbs (113 grams) per 6.0 inch (152 mm) section.
 16. Install locations: Duct work, in the air flow, between evaporator coil and filter.
 17. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.

2.4 NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

- A. Product: GPS-iRIB[®]-18, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 18 inches (457 mm), for use up to 36 inch applications, operation status LED, integral Building Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.
1. Electrical Listings: UL, cUL.
 2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
 3. Input Voltage: 110 to 240 VAC.
 4. Power Consumption: 5 Watts.
 5. Frequency: 50/60 Hz.
 6. Output Voltage: 2 kV.
 7. Total Ion Output: Greater than 35 M ions/cc per ft.
 8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
 9. Alarm Contact Rating: 250 VAC / 1A, N.O. "dry" contact.
 10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
 11. Relative Humidity Range: 0 to 100 percent.
 12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
 13. Ionizer Strip Dimensions (WxLxH): 1.50 x 18.00 x 0.05 inches (38 x 457 x 1.3 mm).
 14. Combined Weight: 0.50 lbs (227 grams).
 15. Install locations: In the air flow.
 16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.
 - b. The high voltage output to be regulated to less than 1 percent variance.
- B. Product: GPS-iRIB[®]-36, Flexible needlepoint bipolar ionization strip. Made from flexible chemical, heat, and cold resistant inert polyimide material. Contains a circuit with carbon fiber ion emitters soldered into the circuit traces. Designed for up to 3,200 CFM or 8 tons. Fixed lengths of 36 inches (914 mm), for applications over 36 inches, operation status LED, integral Building Automation System (BAS) alarm contacts, hook and loop tape for easy installation, and voltage input range of 110 to 240 VAC.
1. Electrical Listings: UL, cUL.
 2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
 3. Input Voltage: 110 to 240 VAC.

4. Power Consumption: 5 Watts.
 5. Frequency: 50/60 Hz.
 6. Output Voltage: 2 kV.
 7. Total Ion Output: Greater than 35 M ions/cc per ft.
 8. Airflow Capacity: 0 to 3,200 CFM or 8 tons.
 9. Alarm Contact Rating: 250 VAC / 1A, N.O. "dry" contact.
 10. Temperature Range: -40 to 140 degrees F (-40 to 60 degrees C).
 11. Relative Humidity Range: 0 to 100 percent.
 12. Power Unit Dimensions (WxLxH): 1.75 x 3.75 x 1.00 inches (44 x 95 x 25 mm).
 13. Ionizer Strip Dimensions (WxLxH): 1.50 x 36.00 x 0.05 inches (38 x 914 x 1.3 mm).
 14. Combined Weight: 0.50 lbs (227 grams).
 15. Install locations: In the air flow.
 16. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.
 - b. The high voltage output to be regulated to less than 1 percent variance.
- C. Product: GPS-FC-3-BAS, 24 VAC or GPS-FC-3T-BAS, 110 to 240 VAC NPBI™ bipolar ionization device with BAS alarm contacts. Designed for up to 3,200 CFM or 8 tons. Carbon fiber brush emitters, operation status LED, integral Building Automation System (BAS) alarm contacts, mounting tabs, positive and negative ion output.
1. Electrical Listings: UL.
 2. Standards Compliance: UL 2998, IAQP, CE, CARB.
 3. Input Voltage: 24 VAC or 110 to 240 VAC.
 4. Power Consumption: 1.2 Watts.
 5. Frequency: 50/60 HZ.
 6. Total Ion Output: Greater than 350 M ions/cc.
 7. Airflow Capacity: 0 - 3,200 CFM or 8 tons.
 8. Temperature Range: -20 to 140 degrees F (-28.9 to 60 degrees C).
 9. Relative Humidity Range: 0-100 percent.
 10. Unit Dimensions (LxHxD): 2.6 x 1.9 x 1.3 inches (66 x 48 x 33 mm).
 11. Unit Weight: 0.23 lbs (104 grams).
 12. Alarm Contact Rating: 24 VAC, 0.1 A, N.O. "dry" contacts.
 13. Install locations: Fan Inlet, in the air flow, zoner diffuser.
 14. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.
 - b. The high voltage output to be regulated to less than 1 percent variance.

2.5 AUTO-CLEANING – DC VOLTAGE OUTPUT

- A. Product: GPS-FC24™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 2,400 CFM or 6 tons. Composite construction allows for mounting in corrosive environments. Universal voltage input, in line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.
1. Electrical Listings: UL, cUL.
 2. Compliance and Certifications: UL 2998, UL 867, IAQP, CE, CARB.
 3. Input Voltage: 24 to 240 VAC.
 4. Amps: Operating: 0.170 to 0.017 A. Cleaning Cycle: 0.33 to 0.03 A.
 5. Power: Operating: 4 watts. Cleaning Cycle: 8 watts.
 6. Frequency: 50/60 Hz.
 7. Total Ion Output: Greater than 300M ions/cc.
 8. Airflow Capacity: 0 to 2,400 CFM or up to 6 tons.
 9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
 10. Relative Humidity Range: 0 to 100 percent.
 11. Ionizer Unit Dimensions (LxWxH): 7.9 x 1.1 x 5.0 inches (200 x 28 x 127 mm).
 12. Ionizer Unit Weight: 1.25 lbs (567 grams).
 13. Alarm Contact Rating: 250 VAC, 1A, N.O. "dry" contact.
 14. Install locations: Fan inlet, In the air flow, zone diffuser.
 15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.
 - b. The high voltage output to be regulated to less than 1 percent variance.
- B. Product: GPS-FC48™-AC, Auto-Cleaning Needlepoint Bipolar Ionization System. Handles up to 4,800 CFM or 12 tons. Composite construction allows for mounting in corrosive environments.

Universal voltage input, in-line On/Off switch, programmable autocleaning cycle, operation status LED, integral Building Automation System (BAS) alarm contacts, magnets for ease of installation and replaceable carbon fiber brush emitters.

1. Electrical Listings: UL, cUL.
 2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
 3. Input Voltage: 24 to 240V AC/DC.
 4. Amps: 0.41 to 0.041 A.
 5. Power Consumption: 10 Watts.
 6. Frequency: 50/60 HZ.
 7. Total Ion Output: Greater than 400 million ions/cc.
 8. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons
 9. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
 10. Relative Humidity Range: 0 to 100 percent.
 11. Unit Dimensions (LxWxH): 11.1 x 1.84 x 3.52 inches (282 x 47 x 89 mm).
 12. Weight: 1.32 lbs (600 grams).
 13. Alarm Contact Rating: 250VAC, 1A, N.O. "dry" contact.
 14. Install locations: Fan inlet, in the air flow, zone diffuser.
 15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240 VAC.
 - b. The high voltage output to be regulated to less than 1 percent variance.
- C. Product: GPS-DM48TM-AC. Auto-Cleaning, Duct Mounted, needlepoint bipolar ionization system. Handles up to 4,800 CFM or 12 tons. Universal voltage input, integral display, programmable auto-cleaning cycle, operation status display, integral Building Automation System (BAS) alarm contacts, 3/4 quick turn duct adapter, 6 ft of watertight flexible conduit, and carbon fiber brush emitters.
1. Electric Approvals: UL, cUL.
 2. Compliance and Certifications: UL 867, UL 2998, IAQP, CE, CARB.
 3. Input Voltage: 24 to 240 V AC/DC.
 4. Power Consumption: 12 Watts.
 5. Frequency: 50/60HZ.
 6. Total Ion Output: Greater than 400M ions/cc.
 7. Airflow Capacity: 0 to 4,800 CFM or up to 12 tons.
 8. Temperature Range: -20 to 140 degrees F (-29 to 60 degrees C).
 9. Relative Humidity Range: 0 to 100 percent.
 10. Unit Dimensions: 3.75 inches (95 mm) diameter. Length: 7 inches (178 mm).
 11. Weight: 2.31 lbs (1.048 kg).
 12. Alarm Contact Rating: 250 VAC, 1A, N.O. "dry" contact.
 13. Install locations: In duct work, in the air flow.
 14. Includes weathertight seals for external duct mounting.
 15. Power Requirements: Operate from 24 VAC to 240 VAC without the use of an external power supply or transformer.
 - a. Primary voltage may vary in range of 24 to 240

VAC. PART 3 - EXECUTION

- 3.1 GENERAL
 - A. Contractor is responsible for maintaining air systems until owner accepts the building (Owner Acceptance).
- 3.2 INSTALLATION, GENERAL
 - A. Needlepoint Bipolar Ionization (NPBITM) Systems:
 1. Assemble and install equipment in a workman like manner to the satisfaction of the Engineer of Record, and Owner's representative.
 2. Damaged or faulty components must be replaced, at no cost additional cost to the owner.
 3. Protect components from dust and damage daily throughout construction.
- 3.3 INSTALLATION, GPS-iMOD[®] - AC VOLTAGE OUTPUT
 - A. Product: GPS-iMOD[®], Modular Air Ionization System.
 1. Installation Location: Downstream of a MERV 6, or higher, 30 percent particulate filter to prevent unnecessary build-up of particulate on the carbon fiber needle tips.
 - a. Mounting Location:
 - 1) Between the particulate filter and cooling coil.

2. Mechanical Installation:

- a. A quantity of 1 GPS-iMOD[®] bar assembly on each coil up to 60 inches (1524 mm) in height. The bars should be spaced a maximum of 60 inches (1524 mm) apart to get optimal ionization coverage on coils.
 - 1) Install such that the GPS-iMOD[®] bar covers the entire finned-width of the coil to the nearest 6 inches (152 mm) without exceeding the finned-width of the coil.
 - 2) Follow manufacturers published installation instructions.

3.4 INSTALLATION - NON-AUTO-CLEANING - DC VOLTAGE OUTPUT

- A. Product: GPS-iRIB[®]-18, Flexible Needlepoint Bipolar Ionization Strip; 18 inches (457 mm) long.
 1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.
 2. Mechanical Installation: Follow manufacturers published installation instructions
- B. Product: GPS-iRIB[®]-36, Flexible Needlepoint Bipolar Ionization Strip; 36 inches (914 mm) long.
 1. Installation Location: Ductless Mini-Split and PTAC Mounting and Wiring.
 2. Mechanical Installation: Follow manufacturers published installation instructions
- C. Product: GPS-FC-3-BAS or GPS-FC-3T-BAS, NPBITM Air Ionization System.
 1. Installation Location: Downstream from filter to prevent build-up of particulates on the ion emitters.
 - a. Locations to mount in preferred order.
 - 1) Downstream from filter and blower, prior to cooling coil.
 - 2) Downstream from filter, blower, and coil.
 - 3) Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
 2. Mechanical Installation: Select a location for installation. Unit needs to be perpendicular to air flow. Mount so ion emitters are exposed to airstream. Air should flow past ion emitters like a football through goal posts.
 - a. Ideal Locations:
 - 1) Typical Split Systems: Blower inlet on blower housing, the side opposite the blower motor. Housings should be so ion emitters extend slightly above side of blower housing.
 - 2) Ceiling Cassette Units: On fan side of protective screen / grille.
 - 3) Mini Split Systems: After filter and behind coil. Typically mounted to wall plate.
 - 4) Ducted Modules: On intake side after filter between the blower housings.
 - b. Follow manufacturers published installation instructions.

3.5 INSTALLATION, AUTO-CLEANING - DC VOLTAGE OUTPUT

- A. Product: GPS-FC48TM-AC, NPBITM Auto-Cleaning Air Ionization System.
 1. Installation Locations to mount in preferred order.
 - a. Downstream from filter.
 - b. Blower inlet on blower housing, the side opposite the blower motor.
 - c. Downstream from filter and blower, prior to cooling coil.
 - d. Downstream from filter, blower, and coil.
 - e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
 2. Alternate Mounting Locations: Supply or return air duct after system filter.
 3. Mechanical Installation:
 - a. Follow manufacturers published installation instructions.
- B. Product: GPS-FC24TM-AC, NPBITM, Auto-Cleaning Air Ionization System.
 1. Installation Locations to mount in preferred order.
 - a. Downstream from filter.
 - b. Blower inlet on blower housing, the side opposite the blower motor.
 - c. Downstream from filter and blower, prior to cooling coil.
 - d. Downstream from filter, blower, and coil.
 - e. Prior to filter is not recommended. Particulate build up will be greater prior to filter. Cleaning will need to be done more frequently.
 - f. Ductless Mini-Split Ceiling Cassette Applications: Mount unit to fan inlet. The emitter brushes should be no closer than 2 inches (51 mm) from any wiring or metal objects.
 2. Mechanical Installation:
 - a. Follow manufacturers published installation instructions
- C. Product: GPS-DM48TM-AC, NPBITM Auto-Cleaning Air Ionization System.

1. Installation Location: Supply air duct.
 - a. Alternate Mounting Location: Return air duct after the filter.
 - 1) The duct must have a depth greater than 8 inches (203 mm) for unit to operate properly.
 - 2) Weatherproof housing allows mounting indoors or outdoors.
2. Mechanical Installation:
 - a. Follow manufacturers published installation instructions

3.6 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

- A. Comply with NECA 1.
- B. Wire and Cable Installation:
 1. Comply with installation requirements in Division 26.
 2. Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.
 - a. Provide shielding to prevent interference and distortion from adjacent cables and equipment.
 3. Terminate Wiring in a Junction Box.
 - a. Clamp cable over jacket in junction box.
 - b. Individual conductors in the stripped section of the cable must be slack between the clamping point and terminal block.
 4. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
 5. Install signal transmission components according to IEEE C2, REA Form 511a, NFPA 70, and as indicated.
 6. Perform continuity and meager testing on wire and cable after installation.
- C. Conduit Installation:
 1. Comply with Division 26.

3.7 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with the "Quality Assurance" Article in PART 1 of this specification and appropriate sections in Division 01.
 1. Manufacturer's Services: Coordinate manufacturer authorized representative's services in accordance with appropriate sections in Division 01.
- B. Manufacturer's Authorized Representative: Provide start-up supervision and training of Owner's personnel in the proper operation and maintenance of equipment.

3.8 TESTING

- A. Provide the manufacturers recommended high voltage verification electrical test.

3.9 PROTECTION

- A. Protect installed products and accessories from damage during construction.

END OF SECTION

PACKAGED ROOFTOP UNITS**PART 1 - GENERAL**

- 1.1 SECTION INCLUDES:
- A. Packaged rooftop air conditioners designed for cooling and heating.
- 1.2 REFERENCES
- A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
 - B. AMCA 99 - Standards Handbook
 - C. AMCA 210 - Laboratory Methods of Testing Fans for Rating
 - D. Purposes AMCA 500 - Test Methods for Louver, Dampers, and
 - E. Shutters.
 - F. ANSI/ASHRAE – Standard 34 Designation of Safety Classification of
 - H. Refrigerants ARI 340/360 - Unitary Large Equipment
 - I. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality
 - J. ASHRAE 90.1 - Energy Standard for Buildings Except Low Rise
 - K. Residential IBC – International Building Code
 - L. IMC – International Mechanical Code
 - M. IFGC – International Fuel Gas Code
 - N. NEMA MG1 - Motors and Generators
 - O. NFPA 54 - National Fuel Gas Code.
 - P. NFPA 70 - National Electric Code.
 - Q. NFPA 72 – National Fire Alarm and Signaling Code
 - R. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems
 - UL 900 - Test Performance of Air Filter Units.
 - UL 60335-2-40 – Standard for Household and Similar Electrical Appliances – Safety Part 2-40
- 1.3 RELATED DOCUMENTS
- A. Section 22 14 00 - Fuel Gas Piping
 - B. Section 23 05 93 - Testing, Adjusting and Balancing
 - C. Section 23 24 00 - Condensate Drain Piping
 - D. Section 23 31 13 - Metal Ducts
 - E. Section 23 43 16 – Air Ionization Systems
- 1.4 SUBMITTALS
- A. Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.
 - B. Product Data:
 - 1. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, and electrical characteristics and connection requirements.
 - 2. Provide computer generated fan curves with specified operating point clearly plotted.
 - 3. Manufacturer's Installation Instructions.
 - C. Factory Tests
 - 1. Provide copies of factory tests as follows;
 - a. Refrigerant circuit leak and run tests.
 - b. Fan assembly run tests.
 - c. Operation of unit controls.
 - d. Final Inspection Report.
 - D. Startup Reports:
 - 1. Provide startup report for each unit. Use manufacturer's standard Startup Form. The installing contractor shall perform the manufacturer's recommended pre-startup checks and a factory authorized service representative shall perform the startup.
- 1.5 OPERATION AND MAINTANENCE DATA

- A. Maintenance Data: Provide instructions for installation, maintenance and service
- B. Warranty Certificates
- 1.6 QUALIFICATIONS
 - A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.
 - B. Startup must be done by factory authorized service representative.
 - C. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.
- 1.7 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver, store, protect and handle products to site.
 - B. Accept products on site and inspect for damage.
 - C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - A. Basis of Design: Daikin
 - B. Suppliers of equipment other than the "basis of design" shall provide a complete description of equipment including; model numbers, performance data, dimensions, weights, clearances, power requirements, etc., to all bidders.
 - C. Bidders utilizing equipment other than the basis of design shall include all modifications necessary to incorporate the equipment furnished into the project at no additional cost to the owner. Modifications shall include but are not limited to the following; electrical work, structural framing, condensate piping, fuel gas piping, unit location and orientation due to equipment dimensions, ductwork connections or service clearances.
 - D. Packaged rooftop units 2050 to 10000 CFM (6 to 25 tons)
 - 1. Aeon RN/RNA Series
 - 2. Carrier 48LC
 - 3. Trane YSK Series
 - 4. Lennox LGT Series
 - 5. Daikin DSG Series (R-32)
- 2.2 Warranty: The manufacturer shall provide the following warranties which shall commence at project substantial completion.
 - A. Parts only warranties
 - 1. Entire unit – 1 year.
 - 2. Compressors – 5 years
 - 3. Control boards – 3 years
 - 4. Heat exchangers – 15 years
 - B. Labor warranties
 - 1. Compressors – 5 years
 - 2. Control boards – 3 years
- 2.3 ROOFTOP UNITS
 - A. Provide as shown on drawings. Unit performance and electrical characteristics shall be per the schedule.
 - B. Configuration: Fabricate as detailed on drawings:
 - 1. Return plenum
 - 2. Filter section
 - 3. Cooling coil section
 - 4. Hot gas reheat
 - 5. Supply fan section
 - 6. Gas heating section.
 - 7. Condensing unit section

- C. The complete unit shall be UL or cETLus listed.
- D. The unit shall be ASHRAE 90.1-2016 compliant and labeled.
- E. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Each unit shall be completely factory assembled and shipped in one piece. Packaged units shall be shipped fully charged with R-454B or R-32 Refrigerant and oil.
- F. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include a refrigeration circuit run test, a unit control system operations checkout, a unit refrigerant leak test and a final unit inspection.
- G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.
- H. Performance: All scheduled EER, IEER, capacities and face areas are minimum accepted values. All scheduled amps, kW, and HP are maximum accepted values that allow scheduled capacity to be met.

2.4 CABINET, CASING, AND FRAME

- A. Panel construction shall be single-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be foil faced with a minimum R-value of 4. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 2.0 inches w.g.
- B. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.
- C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless-steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.
- D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

2.5 OUTDOOR/RETURN AIR SECTION

- A. Unit shall be provided with an outdoor air hood. The outdoor air hood shall allow outdoor air to enter from the back of the unit, at the draw-through filter section. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include a bird screen to prevent infiltration of foreign materials and a rain lip to drain water away from the entering air stream. Outdoor air hood shall be design for 0-25% of unit airflow.
- B. Low leakage dampers shall be provided. Damper blades shall be fully gasketed and side sealed and arranged vertically in the hood. Damper leakage shall be less than 1.5 CFM/Sq. Ft. of damper area at 1.0 inch static pressure differential. Leakage rate to be tested in accordance with AMCA Standard 500. Damper blades shall be operated from multiple sets of linkages mounted on the leaving face of the dampers. Control of the dampers shall be from a factory installed actuator.
- C. Control of the outdoor dampers shall be by a factory installed actuator. Damper actuator shall be of the two position type. Damper to open when the supply fan starts, and close when supply fan stops.

2.6 FILTERS

- A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2" filter. The unit design shall have a hinged access door for the filter section. The

manufacturer shall ship the rooftop unit with 2" MERV 8 construction filters. The contractor shall furnish and install, additional sets of filters as required by this section.

2.7 COOLING COIL

- A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.
- B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.
- C. The cooling coil shall have an electronic or thermostatically controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid sub-cooling and the superheat of the refrigerant system.
- D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.
- E. The drain pan shall be non-corrosive and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit.

2.8 HOT GAS REHEAT

- A. Unit shall be equipped with a staged hot gas reheat coil with hot gas coming from the unit condenser
- B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
- C. The hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F and have a 15°F temperature rise.
- D. Each coil shall be factory leak tested with high-pressure air under water.

2.9 SUPPLY FAN

- A. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be direct drive fan mounted to the motor shaft where available. Belts and sheaves are acceptable only when direct drive is not available due to the additional maintenance.
- B. Supply fan shall be one of the following, designed for airflow range of 60-100% of design airflow;
 - 1. Single width, single inlet (SWSI) airfoil centrifugal fan.
 - 2. Double width, double inlet (DWDI) forward curved.
 - 3. Plenum fan.
- C. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.
- D. Supply fan and motor assembly combinations larger than 8 hp or 22" diameter shall be internally isolated on 1" deflection, spring isolators and include removable shipping tie downs.
- E. The fan motor shall be a totally enclosed Electronically Commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

- F. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.10 NATURAL GAS HEATING SECTION

- A. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.
- B. The module shall be complete with furnace controller and control valve capable of a minimum 2 stage operation.
- C. The heat exchanger tubes shall be constructed of stainless steel.
- D. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases.
- E. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber.
- F. The factory-installed unit control system shall control the gas heat module. Field installed heating modules shall require a field ETL certification. The manufacturer's rooftop unit ETL certification shall cover the complete unit including the gas heating modules.

2.11 CONDENSING SECTION

- A. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.
- B. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25° F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.
- C. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.
- D. Provide hail guards for condenser coils.

2.12 COMPRESSORS

- A. The unit shall have scroll compressors. One of the compressors shall be an inverter driven or a digital scroll compressor providing proportional control. The unit controller shall control the speed of the compressor (inverter driven) or loaded/unloaded time periods (digital scroll) to maintain the discharge air temperature. Each compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.
- B. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.
- C. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.
- D. Each circuit shall be dehydrated and factory charged with R-454B or R-32 Refrigerant and oil.

- E. Provide locking, tamper resistant caps for refrigerant circuit access ports.

2.13 ELECTRICAL

- A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

2.14 CONTROLS

- A. Provide a complete, factory installed, integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including airflow, temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.
- B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
- C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.
- D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.
- E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.
- F. The keypad interface shall allow convenient navigation and access to all control functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:
 - 1. Return air temperature
 - 2. Discharge air temperature
 - 3. Outdoor air temperature
 - 4. Space air temp
 - 5. Dirty filter indication
 - 6. Airflow verification
 - 7. Cooling status
 - 8. Control temperature (Changeover)

9. VAV box output status
10. Cooling status/capacity
11. Unit status
12. All time schedules
13. Active alarms w/time and date
14. Previous alarms with time and date
15. Optimal start
16. System operating hours
 - a. Fan
 - b. Exhaust fan
 - c. Cooling
 - d. Individual compressor
 - e. Heating
 - f. Economizer
 - g. Tenant override
- G. The user interaction with the keypad shall provide the following setpoints as a minimum:
 1. Controls mode
 - a. Off manual
 - b. Auto
 - c. Heat/cool
 - d. Cool only
 - e. Heat only
 - f. Fan only
 2. Occupancy mode
 - a. Auto
 - b. Occupied
 - c. Unoccupied
 - d. Tenant override
 3. Unit operation changeover control
 - a. Return air temperature
 - b. Space temperature
 - c. Network signal
 4. Cooling and heating change-over temperature with deadband
 5. Cooling discharge air temperature (DAT)
 6. Supply reset options
 - a. Return air temperature
 - b. Outdoor air temperature
 - c. Space temperature
 - d. Airflow (VAV)
 - e. Network signal
 - f. External (0-10 vdc)
 - g. External (0-20mA)
 7. Temperature alarm limits
 - a. High supply air temperature
 - b. Low supply air temperature
 - c. High return air temperature
 8. Lockout control for compressors
9. Compressor interstage timers
 10. Night setback and setup space temperature
 11. Building static pressure
 12. Economizer changeover
 - a. Enthalpy
 - b. Dry bulb temperature
 13. Current time and date
 14. Tenant override time
 15. Occupied/unoccupied time schedule
 16. One event schedule
 17. Holiday dates and duration
 18. Service mode
 - a. Timers normal (all time delays normal)
 - b. Timers fast (all time delays 20 sec)
- H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:
 1. Zone sensor with tenant override switch

2. Zone sensor with tenant override switch plus heating and cooling set point adjustment.
(Space Comfort Control systems only)
 - I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:
 1. Airflow
 2. Outside air temperature
 3. Space Temperature
 4. Return air temperature
 5. External signal of 1-5 VDC
 6. External signal of 0-20 mA
 7. Network signal
 - J. DDC controller shall be BACnet compatible or provide interface module to connect the factory installed DDC unit controller to a Building Management and Control System provided by the Owner. Assist the BMCS contractor in connecting to the control network and mapping all points.
 1. Interface module shall connect to the BMCS using BACnet and shall be factory installed in the controls compartment adjacent to the DDC controller.
 - K. Provide a wall mounted thermostat to adjust temperature and humidity setpoints, time schedule, and occupant over-ride through unit mounted DDC Controller.
- 2.15 REFRIGERANT DETECTION SYSTEM
- A. Provide sensors, elements, wiring and controls as required to maintain refrigerant concentration below the Detection Threshold Limit Value (DTLV) in accordance with UL 60335-2-40.
- 2.16 DUCT SMOKE DETECTION (UNITS MORE THAN 2000 CFM)
- A. Interlock Direct Digital Control system with duct smoke detectors provided in Division 26 specification section Fire Alarm in accordance with NFPA 70 and NFPA 90A.
 1. Install in supply and return ducts. Supply fan and all cooling and heating functions shall be de- energized. Power to DDC unit controls shall not be interrupted.

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 RTUs.
 - B. Examine roughing-in for RTUs to verify actual locations of piping and duct connections before equipment installation.
 - C. Examine areas for suitable conditions where RTUs will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 INSTALLATION
 - A. Unit Support on reinforced concrete pad on grade: Install units level on supports as indicated in accordance with manufacturer's instructions. Refer to architectural and or structural drawings for concrete pad.
- 3.3 CONNECTIONS
 - A. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
 - B. Install piping adjacent to RTUs to allow service and maintenance.
 - C. Duct installation requirements are specified in other HVAC Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 1. Install ducts to termination at horizontal unit connections.
 2. Connect supply ducts to RTUs with flexible duct connectors specified in Section

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
 - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. RTU will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions.
 - 1. Inspect for visible damage to unit casing.
 - 2. Inspect for visible damage to compressor, coils, and fans.
 - 3. Inspect internal insulation.
 - 4. Verify that labels are clearly visible.
 - 5. Verify that clearances have been provided for servicing.
 - 6. Verify that controls are connected and operable.
 - 7. Verify that filters are installed.
 - 8. Clean condenser coil and inspect for construction debris.
 - 9. Verify lubrication on fan and motor bearings.
 - 10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 11. Adjust fan belts to proper alignment and tension.
 - 12. Start unit according to manufacturer's written instructions.
 - a. Start refrigeration system.
 - b. Do not operate below recommended low-ambient temperature.
 - c. Complete startup sheets and attach copy with Contractor's startup report.
 - 13. Inspect and record performance of interlocks and protective devices; verify sequences.
 - 14. Operate unit for an initial period as recommended or required by manufacturer.
 - 15. Calibrate thermostats.
 - 16. Adjust and inspect high-temperature limits.
 - 17. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
 - 18. Start refrigeration system and measure and record the following when ambient is a minimum of 15 deg F (8 deg C) above return-air temperature:
 - a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outdoor-air, dry-bulb temperature.
 - d. Outdoor-air-coil, discharge-air, dry-bulb temperature. R
 - 19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 - 20. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Outdoor-air intake volume.
 - 21. Simulate maximum cooling demand and inspect the following:
 - a. Compressor refrigerant suction and hot-gas pressures.
 - b. Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
 - 22. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - a. Low-temperature safety operation.
 - b. Filter high-pressure differential alarm.
 - c. Smoke and firestat alarms.

23. After startup and performance testing and prior to Substantial Completion, replace existing filters with new filters.

3.6 CLEANING AND ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- B. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

3.8 EXTRA MATERIALS

- A. Provide the following extra materials for each unit at substantial completion or as noted below. The contractor shall obtain a receipt for all items turned over to the owner.
 1. Belts: Provide one (1) complete set of belts for each unit with a belt drive motor.
 2. Filters: Provide four (4) complete sets.
 - a. Install initial set of filters prior to equipment startup.
 - b. Install second set of filters prior to Test Adjust and Balance work.
 - c. Provide two complete sets of filters to the owner and obtain receipt.

END OF SECTION

DIVISION 26 SECTION 26 05 00 – ELECTRICAL GENERAL INFORMATION AND REQUIREMENTS

PART 1 – GENERAL

- 1.1 Bidding and/or Negotiation Requirements, Conditions of the Contract and pertinent portions of Sections in Division 00 of these Specifications, apply to the Work of this Section as fully as though repeated herein.

PART 2 - SCOPE

- 2.1 Work covered by this section of Electrical Specification consists of furnishing material, labor, equipment, components, tools, etc., indicated by or reasonably inferred from Contract Drawings and this Specification for the Remodel of Labs, Classrooms and Offices of T.L. James Hall at Grambling State University at Grambling, Louisiana.
- 2.2 Electrical facility including all electrical power systems and special electronic systems shall be installed complete and fully operational to extent of the drawings and specifications, and to the satisfaction of the Owner, Architect, and Engineer.
- 2.3 Work shall include but not necessarily be limited to the following general list:
- A. Conduit, Raceway and Fittings
 - B. Pulling Cables (Fish Wires)
 - C. Power Conductors and Signal Cabling
 - D. Branch and Feeder Circuitry Alterations and Additions
 - E. Boxes including Junction, Outlet, and Utility Boxes
 - F. Wiring Devices and Occupancy Sensors Alterations and Additions
 - G. Contactors, Relays, and Photoelectric Switches
 - H. Miscellaneous Lighting and Power Panelboards
 - I. Distribution Panels Alterations and Additions
 - J. Disconnect Switches Alterations and Additions
 - K. Overcurrent Protective Devices
 - L. Supporting Devices
 - M. Grounding Systems
 - N. Surge Protection Device (SPD)
 - O. Lighting Fixtures, LEDs, Drivers, and Accessory Alterations and Additions
 - P. Emergency and Exit Battery Pack Lighting Alterations and Additions
 - Q. Exterior Building Mounted LED Lighting Fixtures
 - R. Fire Alarm System
 - S. Closed Circuit Television CCTV Empty Conduit System
 - T. Temperature Control and Control and Interlock Wiring
 - U. Communication Wiring and Hardware for Telephone and Computer/ Data System
 - V. Equipment Connections
 - W. Temporary Lighting and Power for Construction
- 2.4 QUALITY ASSURANCE

- A. All electrical materials including distribution and utilization equipment shall be UL listed. Perform all work in accordance with the latest Louisiana adopted edition of the National Electrical Code and local codes.
- B. All equipment and materials for the T.L. James Hall Remodel shall be new and unused and of United States Domestic Manufacture (Made in USA) unless approved otherwise by contract documents.
- C. Eliminate any abnormal sources of noise that are considered not to be an inherent part of the electrical systems as designed.

2.5 COORDINATION WITH OTHER TRADES

- A. Coordinate the work of this division with all other divisions to ensure that all components of the electrical system will be installed at the proper time and fit the available space.
- B. Locate and size all openings in work of other trades required for the proper installation of the electrical system components.
- C. Make all electrical connections to all equipment furnished by this division and any other division.
- D. Make all 120 volt electrical normal and emergency power connections between dampers and switches to associated exhaust fan(s) furnished by any other division.
- E. Locate and provide 120 volt electrical connection at all mechanical control panels including the control panel in Janitor's Closet #123.

PART 3 - GENERAL REQUIREMENTS

3.1 SITE VISIT

- A. Electrical Contractor is instructed to visit the site and Engineer, as necessary, before submitting bid to make himself completely familiar with any unusual physical conditions or code requirements. No allowance shall be made for existing conditions and requirements of which Electrical Contractor was not aware.
- B. The Electrical Contractor shall become familiar with the buildings site and shall survey any existing electrical installations and infrastructure. He shall utilize his on-site survey information and the contract document information provided to define the scope work and materials to be provided to complete the electrical project. Electrical Contractor's bid shall include all corresponding costs.
- C. The Electrical Contractor shall visit the site with plans-in-hand to determine extent and scope of work on this project prior to turning in bid price.

3.2 CODES, FEES, REGULATORY AGENCIES

- A. Material shall be furnished and electrical work shall be performed in accordance with the latest

applicable, Louisiana adopted edition of National Electric Code, rules and regulations of the Occupational Safety and Health Administration, Department of Labor, Local Electric Utility Company, International Building and Fire Codes, Life Safety Code, Americans with Disabilities Act (ADA) and State and Local Code regulations and agreements that may govern. If any conflict between Codes exists, more rigorous interpretations shall generally be deemed correct. However, any conflict between Codes or between Codes and Electrical Contract Drawings shall immediately be brought to the attention of Engineer or Architect for adjudication before installation.

- B. Electrical Contractor shall secure and pay for permits, inspections, fees, taxes, certificates, etc., necessary and required to perform his work of both temporary and permanent nature. He shall pay for and secure required certificates of electrical inspection both during and upon completion of this work. He shall present final certificates to Owner prior to applying for final payment.

3.3 DESIGN DRAWINGS

- A. The intent of the drawings is to establish the types of systems and functions, but not to set forth each and every item essential to the functioning of the system. Electrical Contractor will not be compensated for extra costs incurred for furnishing and/or installing items and components of systems which are obvious, or which may be held to be necessary for the complete operation or function of the project.
- B. The drawings are schematic in nature. They show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Determine exact locations by review of equipment manufacturer's data, by jobsite measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. The size of the electrical equipment indicated on the drawings may be based on the dimensions of a particular manufacturer. While other listed manufacturers will be acceptable, it is the responsibility of the Electrical Contractor to determine if the equipment that Electrical Contractor proposes to furnish will fit in the space. The drawings are not intended to show exact locations of conduit and wire, or to indicate all wire terminations, connections, conduit fittings, boxes, or supports, but rather to indicate distribution, circuitry, control, and intent.
- C. The Electrical drawings are necessarily diagrammatic in character and cannot show every connection in detail or conduit in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The Electrical Contractor shall carefully investigate structural and finish conditions and shall coordinate with other trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases, above suspended ceilings, and concealed where construction permits, etc. when work occurs in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid crippling of structural members. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.
- D. When the mechanical and electrical drawings do not give exact details as to the elevation of pipes, conduits, and ducts, Electrical Contractor shall physically arrange the systems to fit in the space available at the elevations intended with the proper grades for the functioning of the system involved. Exposed conduits are generally intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The drawings do not show all required offsets and their location details. Work shall be

concealed in all finished areas. Electrical Work shall be performed in accordance with Electrical Contract Drawings, approved Shop Drawings and Specifications. Electrical Contractor shall consult drawings and specifications of other trades and shall coordinate installation therewith.

- E. Should revision in work of any other trades be necessary in order to accomplish the electrical installation, Electrical Contractor shall consult with Architect in adequate time to have such revision determined, authorized and incorporated into scheduled progress of work.
- F. Discrepancies between drawings, between drawings and field conditions, or between drawings and specifications shall be brought to the attention of Electrical Contractor or Architect for decision, previous to installation.

3.4 SHOP DRAWINGS

- A. Electrical Contractor shall submit the following shop drawings for approval:
 - 1. Wiring Devices, Contactors, Occupancy Sensors and Photo-Electric Switches
 - 2. Disconnect Switches
 - 3. Wireways and Enclosures
 - 4. Conduit and Conduit Fittings
 - 5. Power and Signal Conductors and including MC Cable as Required
 - 6. Distribution, Lighting and Receptacle Panelboards and Loadcenters
TVSS/SPD Units
 - 7. Fuses and Circuit Breakers
 - 8. Telephone and Computer/Data Communication System Signal Cables and
Components
 - 9. Lighting Control Scheme Components
 - 10. Lighting Fixtures, Lamps, Ballast, LEDs, Drivers, and Accessories
 - 11. Fire Alarm System Components including Battery Calculations
 - 12. Identification Tags and Nameplates
 - 13. Any "Equal" Item Furnished by Electrical Contractor
- B. In addition to those listed above, other shop drawings may be required by Architect, Engineer, or Electrical Contractor.
- C. Six copies of shop drawings shall be submitted for approval as soon as possible after award of the contract. Refer to Section 01 33 00 – "Submittal Procedures" for additional information.
- D. Shop drawings shall be submitted in bound folders according to equipment categories, i.e., all lighting fixtures shall be bound in one folder, all switchgear shall be bound in one folder, etc.
- E. Shop Drawings shall be executed for this job specifically and shall not contain miscellaneous information, which is not pertinent. Information required includes manufacturer's name, catalog number, physical dimension and weight, electrical characteristics and ratings, and wiring diagrams necessary to indicate precise connections for this job and for no other different application.

3.5 PRIOR APPROVALS

- A. Should Electrical Contractor desire to furnish materials by manufacturers other than those specified or mentioned in these specifications or noted on the drawings, he shall be required to comply with substitution requirements described in Architectural Section 01 25 00 – “Product Substitution” of these specifications.

3.6 “AS BUILT” DRAWINGS

- A. Electrical Contractor shall acquire a set of reproducible Electrical Contract Drawings. He shall keep one set of prints in his field office to be used only for indication of all field revisions, modifications, etc. and shall periodically transfer this information to set of reproducibles to reflect complete “As Built” conditions.
- B. At conclusion of project, Electrical Contractor shall furnish above set of reproducibles and one set of prints made from them to the Architect. In addition to modification of conduit runs, circuitry, etc., Electrical Contractor shall indicate dimensionally the location of junction, pull boxes, direct burial cables, etc. located on exterior site.

3.7 WARRANTY

- A. Electrical Contractor shall execute Certificate of Guarantee to Owner for a period of one (1) year from date of notice of final acceptance (unless a different period is specifically noted elsewhere in Contract Documents). Certificate of Guarantee shall cover electrical material and equipment furnished by Electrical Contractor as well as entire electrical installation executed by the Electrical Contractor. Should any item included in guarantee become defective during guarantee period, repair and replacement costs shall be paid by Electrical Contractor. Lighting fixture lamps are not included in warranty. However, obvious premature lamp burnouts shall be replaced by the Electrical Contractor prior to leaving the project.

3.8 ACCEPTANCE OF WORK

- A. Before final payment is made, Electrical Contractor shall have completed the work required by Contract Drawings and Specifications, completed continuity and megohm resistance and lighting control test, low voltage megger test, made any modifications or corrections to work as required after a review by the Owner or his representatives, and delivered guarantees, warranties, final inspection certificates, operating and maintenance instructions, and “As Built” drawings to the Owner.

3.9 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Three sets of operating and maintenance instructions shall be furnished for each electrical control or alarm system, for switchboards (particularly for any ground fault equipment therein), and for any other unusual item furnished under this contract.

3.10 WORKMANSHIP

- A. Work shall be performed and equipment installed in accordance with best practices of industry. Workmanship, which fails to comply with requirements and/or intent of Contract Documents shall be removed promptly upon request of Engineer, Owner, or Architect and immediately replaced in an acceptable condition with no additional expense to the Owner.

- B. Provide adequate skilled workers, properly supervised and sufficient quantities of materials and equipment to the end that the general progress of the work shall not be delayed. A competent superintendent who will be responsible for the correctness of all work shall be available to all trades at all times on the project.

3.11 MATERIALS

- A. Electrical material and equipment shall be new, of recent manufacture and shall bear inspection labels.
- B. Where standards have been established by Underwriters, material and equipment shall bear the Underwriters' Laboratories Label.
- C. Similar material shall be the product of a single manufacturer.
- D. Material and equipment shall be inspected for damage upon arrival at the jobsite and if any indication of rough handling during shipment is visible, a claim shall be filed with Carrier at once and Manufacturer and Owner notified in writing.
- E. If it is necessary to store materials outdoors during construction period, they shall be thoroughly protected to prevent moisture and foreign material from reaching their surfaces.

3.12 MATERIAL BY OTHERS

- A. Material furnished by others will generally consist of motor starters, variable speed drives, control stations, and miscellaneous control devices. However, other materials and systems may be furnished.
- B. Any other materials and systems to be furnished by others will be specifically indicated elsewhere in specifications and/or on Contract Drawings.
- C. Material furnished by others for installation by the Electrical Contractor shall be received, unloaded, stored and protected until accepted by the Contractor. Material shall be accepted from supplying Electrical Contractor at time and location mutually agreeable, and then shall store, handle, install and protect it from damage or pilferage both before and after installation with no additional charge.

3.13 EXCAVATION AND BACKFILL

- A. Electrical Contractor shall perform trenching, excavation and backfill associated with his work.
- B. Backfill shall be soil, sand or other project approved granular material, applied in layers, not exceeding eight inches in thickness and separately compacted.
- C. Additionally, excavation, backfill and compaction must be performed in accordance with related specifications of Contract (Architectural Specifications).
- D. All major exterior underground routes with power and/or signal conduits shall have a 6" wide yellow, plastic, warning tape placed in the trench approximately 12 inches above the conduit routes.

3.14 CUTTING, PATCHING, AND PAINTING

- A. Any cutting and patching of structural members necessary to electrical work shall be performed under the direct supervision of the project's General Contractor.
- B. Any openings made by Electrical Contractor in floors, ceiling or walls shall be neatly patched by the Electrical Contractor under the direct supervision of the General Contractor.
- C. Penetrations through rated fire walls and floors shall be patched and sealed air-tight with an approved fire resistive material. Seal fittings with potting compounds shall be utilized where required for hazardous installations. Receptacles and other outlets to be installed in new fire rated walls shall be configured with fire resistive components such as "puddy pads". As per codes, receptacles shall not be installed back-to-back in fire rated walls, but rather placed 24 inches apart horizontally minimum on opposite sides of a fire wall.
- D. Any cutting or patching necessary due to failure of Electrical Contractor to place his work correctly or in sufficient time shall be performed by trade normally performing this function. Cost of such work shall be borne by Contractor.
- E. All iron and steel shall be protected against rusting. Material, which does not have a protective factory finish such as galvanizing, shall be painted at the time of installation.
- F. After equipment with factory applied finished has been installed, all scratches, discoloration, chips, ink markings, tape, tar, grease, etc., shall be removed, repaired and refinished to the satisfaction of the Architect in order to make equipment appearance look factory fresh.
- G. Electrical apparatus surface mounted on exterior building walls and on screened service court walls shall be painted to match the wall color by the Electrical Contractor. Prime paints shall be compatible with finish paints specified in Section 09 90 00 – "Painting". Equipment nameplates and lighting fixtures shall not be painted.

3.15 SAFETY

- A. The Electrical Contractor shall be solely responsible for the means, methods, and sequences of construction and for the safety of workers and others on the construction site.

3.16 SEISMIC AREAS

- A. All equipment, conduit, supports, etc. installed in seismic areas shall be mounted and braced per local earthquake codes.

3.17 DEMOLITION

- A. Electrical Contractor shall review the drawings, visit the site and examine the premises and any electrical installation before submitting his bid to thoroughly familiarize him/herself with existing conditions and locations. He shall appraise the required demolition work required if any. Failure of Electrical Contractor to visit site with plans-in-hand to review and evaluate existing conditions and requirements shall not be cause for extra compensation after award of the contract.

3.18 CONCRETE WORK

- A. Electrical Contractor shall furnish and install concrete work required for the electrical installation including transformer pads, equipment housekeeping pads, lighting standard foundations, etc. Concrete finishing shall be made to ACI standard finishing requirements.

3.19 ACCESS PANELS

- A. Electrical Contractor shall be responsible for any and all equipment access panels required for his work. The purchase and installation for required access panels shall be coordinated with and approved by the Architect.

3.20 EQUIPMENT CONNECTIONS

- A. Miscellaneous equipment shall be connected completely by the Electrical Contractor whether receptacle or spliced terminations are required. Miscellaneous electrical appurtenances necessary for these hookups shall be provided by Electrical Contractor.
- B. All equipment on this project which is furnished and installed by the Owner or others, and requires electrical hookups, shall be roughed-in and connected (terminated) by the Electrical Contractor unless noted otherwise in these specifications or on drawings.

3.21 MARKING OF HIGH VOLTAGE COMPONENTS

- A. Distribution boards and miscellaneous panels, disconnect switches and any other enclosures which can be opened without a screwdriver with 208 volt wiring inside are to be marked with a sizable, durable backing warning that High Voltage is inside.

3.22 TEMPORARY ELECTRICAL SERVICE INCLUDING TEMPORARY LIGHTING

- A. Temporary electrical service for construction purposes shall be installed as directed by the Electrical Contractor. A sufficient number of 120 and 240 volt outlet points shall be provided so that power is available to each building contractor within the reach of a 100- foot long extension cord. At each outlet point, provide four 120-volt, single phase, duplex grounded type receptacles and two 240 volt, single phase 50 Amp power outlets. Comply with personnel type GFCI requirements as stated in NEC 210-8(b). Temporary lighting shall be provided throughout this building and project as directed by the Electrical Contractor and as per General Contractor OSHA requirements.

3.23 ELECTRICAL POWER OUTAGES

- A. Electrical Contractor shall co-ordinate with Grambling State University campus management to set up a timetable for any and all required power outages in order to accomplish the electrical work on this project and to do so without causing major campus operating inconveniences. Care shall be taken in the planning, timing, and execution of power outage related work.

3.24 MISCELLANEOUS

- A. Electrical Contractor shall instruct Owner's operating personnel in operation and maintenance of

electrical equipment including furnishing of necessary literature, shop drawings, etc. Electrical Contractor shall provide plastic engraved nameplates (not tapewritter) for telephone cabinet, main switchboard, power panelboards, magnetic motor starters, lighting panelboards, disconnect switches including those contained within the main switchboard and distribution panels, meter bases, time clocks, control stations, emergency system equipment and other related electrical contained within enclosures.

- B. The Electrical Contractor shall have his project foreman remain on site on opening day to handle any emergencies.

END OF SECTION 26 05 00

DIVISION 26 SECTION 26 05 01 – COMMON WORK RESULTS FOR ELECTRICAL POWER SYSTEMS

PART 1 – GENERAL

1.1 Conditions of the Contract and Division 00; apply as applicable to this section.

1.2 SUMMARY

- A. Provide all work for electrical systems required in the project to be properly installed, tested, and performing their intended function.

1.3 QUALITY ASSURANCE

- A. Perform all work in accordance with the latest edition of the National Electrical Code and local codes.
- B. All electrical materials and distribution, and utilization equipment shall be UL Listed.
- C. All equipment and materials shall be new and unused.
- D. Eliminate any abnormal sources of noise that are considered by the architect not to be an inherent part of the electrical systems as designed.

1.4 COORDINATION WITH OTHER TRADES

- A. Coordinate the work of Divisions 26, 27, and 28 with all other divisions to ensure that all components of the electrical system will be installed at the proper time and fit the available space.
- B. Locate and size all openings in work of other trades required for the proper installation of the electrical system components.
- C. Make all electrical connections to all equipment furnished by this division and any other division.
- D. Make all electrical connections from all 120 volt and greater dampers and switches to associated exhaust fan(s) furnished by any other division.

1.5 DRAWINGS

- A. The drawings are schematic in nature, but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Determine exact locations by review of equipment manufacturer's data, by jobsite measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. The size of the electrical equipment indicated on the Drawings may be based on the dimensions of a particular manufacturer. While other listed manufacturers will be acceptable, it is the responsibility of the Electrical Contractor to determine if the equipment that the Electrical Contractor proposes to furnish will fit in the space. The drawings are not intended to show exact locations of conduits and wire, or to indicate all wire terminators, connectors, conduit fittings, boxes, or supports, but rather to indicate distribution, circuitry, control, and

intent. The Electrical Drawings are necessarily diagrammatic in character and cannot show every connection in detail or conduit in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The Electrical Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid crippling of structural members. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

- B. When the Mechanical and Electrical Drawings do not give exact details as to the elevation of pipe, conduit, and ducts, physically arrange the systems to fit in the space available at the elevations intended with the proper grades for the functioning of the system involved. Exposed conduit is intended to be installed true and square to the building construction, and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets and their location details. Work shall be concealed in all finished areas.

1.6 SUBMITTALS

- A. Specification Review:

- 1. Include a paragraph-by-paragraph written specification review for each product listed requiring a submittal. Denote any proposed deviations from specifications.

1.7 SERVICE INTERRUPTIONS

- A. It shall be understood that all such service interruptions shall be made at the Owner's convenience, not the Electrical Contractor's. No increase in contract amount will be allowed for reasons of premium time, inefficiency of operations, or other considerations not calculated in original bid.
- B. All items removed but required by new construction shall be stored on-site. Schedule a review of the items with the Owner. Remove from site all items the Owner does not choose to keep. Deliver Owner designated items to Owner's storage facility.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 EXISTING WORK

- A. Provide temporary wiring and connections as may be necessary to maintain existing conditions in service during construction.
- B. When performing work on energized equipment or circuits, use personnel experienced and trained in similar operations.
- C. Repair adjacent construction and finishes damaged during any demolition and extension work.

3.2 OWNER INSTRUCTION

- A. Provide on-site Owner training for all new equipment.
- B. Use Operation and Maintenance manuals and actual equipment installed as basis for instruction.
- C. At conclusion of on-site training program, have Owner personnel sign written certification they have completed training and understand equipment operation. Include copy of training certificates in final Operation and Maintenance manual submission.

END OF SECTION 26 05 01

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 shall apply to this Section as fully as though repeated herein.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electronic safety and security system equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electronic safety and security installation requirements.

1.3 SUBMITTALS

- A. Provide product data for sleeve seals.

1.4 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right-of-way for piping and conduit installed at required slope.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel pipe sleeves shall be ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, with plain ends.
- B. Cast-iron pipe sleeves shall be cast or fabricated “wall pipe”, equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.2 GROUT

- A. Nonmetallic, shrinkage-resistant grout shall be ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 – EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Provide headroom maintenance if mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment shall be install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of way shall be given to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY SYSTEMS PENETRATIONS

- A. Electronic safety and security system penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete slabs and walls shall have installed sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-rated assemblies shall have installed sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide ¼-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool

exposed surfaces smooth; protect grout while curing.

- I. Interior penetrations of non-fire-rated walls and floors shall have sealed annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
- J. Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.
- K. Aboveground, exterior-wall penetrations shall be sealed penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- L. Underground, exterior-wall penetrations shall utilize installed cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security system installations to restore original fire-resistance rating of assembly.

END OF SECTION 26 05 02

DIVISION 26 SECTION 26 05 18 – EXISTING SECONDARY POWER SERVICE ENTRANCE

PART 1 - GENERAL

1.1 This section covers the existing underground secondary power service entrance.

A. The power service entrance is existing to remain intact and in service.

END OF SECTION 26 05 18

DIVISION 26 SECTION 26 05 19 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND SIGNAL CABLES

PART 1 - GENERAL

- 1.1 This section covers copper power conductors and copper signal conductors and cables rated 600 volts and below.
- 1.2 Signal conductors and cables for Fire Alarm, Computers, Networks, and Telephones will be furnished, installed and terminated by the Electrical Contractor and his Special Electronic System Vendors.
- 1.3 Above finished ceilings on this project are not return air plenums. Therefore, conventional PVC insulated, Class 2 signal cabling can be utilized “open” without conduit. Conduit will be required in non-accessible locations and in exposed construction areas.
- 1.4 Above hard sheetrock ceilings are considered non-accessible.

PART 2 - PRODUCTS

2.1 BUILDING WIRING USING SINGLE COPPER CONDUCTORS

A. Conductors:

1. No. 12 AWG and No. 10 AWG conductors shall be solid, plain copper per ASTM B3.
2. No. 8 AWG thru 600 KCM conductors shall be bare, annealed, stranded, copper conductors per ASTM B3 and ASTM B8.

B. Insulation:

1. Color-coded premium grade flame retardant heat and moisture resistant polyvinyl chloride (PVC).

C. Jacket:

1. Polyamide (nylon).

D. Manufacturers:

1. General Cable Company
2. Southwire Company

2.2 TYPE MC (METAL CLAD) CABLES

- A. Type MC (metal clad) cables will not be permitted in exposed construction locations and areas.

- 2.3 Conductors which supply 100 percent rated circuit breakers and those conductors which are powered and protected by 100 percent rated circuit breakers shall have insulation rated at 90°C. Such conductors shall be utilized based on the National Electrical Code's 75°C ampere ratings.

- 2.4 Power conductor sizes #12 AWG and #10 AWG shall be solid. Conductor sizes #8 AWG and larger shall be stranded.
- 2.5 Minimum size conductors for power and lighting branch circuitry shall be #12 AWG.
- 2.6 Maximum size conductors for feeders and power circuiting shall be 600 MCM copper.
- 2.7 All conductor insulation shall be rated for 600 volts at 75°C unless specifically noted otherwise.
- 2.8 Utilization of insulation shall be as follows:
- | | |
|---|--------------------------|
| A. Lighting and appliance branch circuiting | THWN, THHN |
| B. Main and subfeeders. | XHHW, THWN, THHN |
| C. Fixture wires. | TFN, TFFN, SF, RHH, THHN |
| D. Lighting fixture channel housings in continuous rows. | THHN, 90°C. |
| E. Branch circuit wiring installed in close proximity to upper surface of roof.
(Ex: Within roof deck) | THHN, 90°C. |
- 2.9 Exterior of conductors shall be color coded as follows:
- | |
|--|
| A. Phase wires of different voltage systems. |
| B. Neutral and phase wires of each voltage system. |
| C. The grounding system wire. |
- 2.10 COLOR CODING SHALL BE AS FOLLOWS:
- | |
|---|
| A. 120/208 Voltage System: |
| 1. Phase A - black |
| 2. Phase B - red |
| 3. Phase C - blue |
| 4. Neutral - white |
| B. Equipment and system ground wires shall have green colored insulation. |
- 2.11 Wire and cable shall be of recent manufacture, preferable product of a single manufacturer, unused and delivered to jobsite in original cartons or reels. Provide and submit evidence that conductors are new.
- 2.12 Low Voltage Class 2, Signal Conductors and Cabling used for Special Electronic Systems (example: Fire Alarm, Telephones and Computers) may be installed "open" without metal conduit above accessible ceilings provided that the signal conductors and cables are properly and safely and securely installed, and that the signal cables have the proper insulation for the ceiling space they are being installed within. Signal conductors and cabling shall be properly trained and supported as per the contract documents. Refer to Paragraphs 1.2, 1.3 and 1.4 of this section for more information. PART 3 – EXECUTION

- 3.1 Where factory applied colors are unavailable Electrical Contractor shall install black conductors and apply plastic tape, in appropriate colors, continuously for a distance of two inches. Do not use spray paint for color coding. Conductors shall be taped in panels (adjacent switch or circuit breaker lugs within 4 inches), pull boxes, junction boxes, and outlet boxes.
- 3.2 Maintain all conductor splices and joints in accessible enclosures where easy inspection is available as per the National Electric Code.
- 3.3 Join solid conductors in outlet boxes with expandable type insulated coiled steel spring connections (wirenut), or by twisting and soldering. Do not make wirenut splices in wireways and in panelboard wiring gutters. Where such splices are absolutely necessary, make splices with in-line, insulated butt splice connectors.
- 3.4 Terminate solid conductors by means of a neat and fast application directly to the binding screw or post of the equipment.
- 3.5 Join, tap, and terminate stranded conductors #8 AWG and larger by means of bolted "saddle type" or pressure indent type connectors, taps and lugs. Exclude connectors and lugs of the types which apply set screws directly to conductors. Apply pressure indent connectors, taps and lugs utilizing tools manufactured specifically for the purpose and having features preventing their release until the full pressure has been exerted on the lug or connector. Do not use wirenuts for stranded conductors sizes #8 AWG and larger.
- 3.6 Except where wirenuts are used, build up insulation over conductor joints to a value, equal both in thickness and electric strength to that of the factory applied conductor insulation.
- 3.7 All conductors shall be routed continuous from outlet to outlet. Avoid unnecessary splicing.
- 3.8 Leave sufficient slack on all conductor runs to permit secure connections at equipment.
- 3.9 All conductors shall be installed simultaneously in a single raceway. Delay "pulling-in" until the project progresses to a point where conductors shall not be exposed to injury and moisture.
- 3.10 Use only specifically manufactured lubricant from wire pulling purposes.
- 3.11 Dress and lace wires and cables in all cabinets and pull boxes and use necessary insulated supports (nylon ty-wraps, etc.) to prevent shifting. Do not use electrical tape or short lengths of conductors to secure and train conductors in panelboard and cabinet wireways.
- 3.12 LOW VOLTAGE, CLASS 2 SIGNAL CONDUCTORS AND CABLING INSTALLATIONS
 - A. By referring to sections of Division 27 of these specifications, it can be seen that non- plenum rated, Category 6A signal cables will be installed on this project. These cables must be installed in a prescribed manner in order to allow proper operation (high speed baud rate data transfer) of the electronic equipment the cables interconnect. Installation of Category 6A signal cables shall be accomplished as follows when cables are installed "open" in ceiling joist/spaces and within accessible spaces. Signal cables must be installed in EMT conduit within Owner's existing IT Rooms.

1. Cat.6A cables shall not lay directly on top of light fixtures. Regardless of ballast or driver type (magnetic or electronic) Cat.6A signal cables should be routed at least five (5") inches away from LED fixtures, power conductors, and other power consuming loads.
2. Cat.6 signal cables are commonly supported at distant intervals causing physical stress due to tensile loading. When this occurs, cable geometry is altered resulting in reduced data transmission speed. The maximum tensile loading should not exceed 25 lbs., beyond this point performance is threatened. Correcting cable tension to lighten the load after it has been stressed may not reverse the effect of over-loading.
3. Pulling Cat.6A signal cables through conduit with too small of a bend radius. Cables should be "swept" to prevent bends. The bend radius will not be less than eight times the outside diameter of the cable. For Category 6A cables, this means the cable may not be bent beyond 1.25". Kinking the cable jacket changes the shape of the cable core, moves the pairs, and distorts the symmetry. Again, this sort of damage can be permanent despite efforts to work them out.
4. Over-cinching can cause compression of the cable jacket, deforming the cable, and causing the same effects as over-bending and kinking the cable. Cable ties or cords must never be tightened to the point that strain is placed on the jacket.
5. Routing too many cables in a bundle. Cables on the inside of the bundle can be damaged as well as cables on the outside. Bundles must be examined to assure the weight of the bundle is not causing additional compression on the cables' jackets. This is also a concern for cables installed within a tray or duct, as they can easily be crushed.

END OF SECTION 26 05 19

PART 1 - GENERAL

- 1.1 This section covers low voltage temperature control wiring, low voltage control and interlock wiring and line voltage interlock wiring.

PART 2 - PRODUCTS

- 2.1 Refer to Specification Section 26 05 19 for conductor and cable characteristics and ratings.
- 2.2 Refer to Specification Section 26 05 33 for conduit and raceway types and materials.

PART 3 - EXECUTION

- 3.1 Low voltage temperature control, and control and interlock wiring operating at 30 volts or less shall be furnished, installed, and terminated under the Mechanical Contract, and including any required conduit.
- 3.2 Line voltage control and interlock wiring operating at over 30 volts for motors, starters, heaters, damper operators, smoke detectors, louvers, etc. shall be furnished, installed, and terminated by the Electrical Contractor. Electrical Contractor will furnish and install EMT conduit for all signal wiring and cabling on this project, except for the signal cabling of Paragraph 3.1 immediately above.
- 3.3 Associated control power wiring and related line voltage control wiring shall be installed in accordance with Sections 26 05 19, 26 05 26, 26 05 29, and 26 05 33 of these specifications.
- 3.4 Refer to Mechanical Drawings for exact locations of mechanical equipment such as air conditioning units, exhaust fans, unit heaters, unit coolers, dampers, etc.

END OF SECTION 26 05 24

DIVISION 26 SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide a continuous, low-impedance, grounding system for the entire electrical distribution and wiring systems.
- B. This project consists of an existing building. A UFER grounding electrode will not be required.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 – Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - 2. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment.
- B. NFPA 70 – National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Grounding systems shall use the following elements as grounding electrodes:
 - 1. Metal underground cold water pipes
 - 2. Metal building frames
 - 3. Groundrod electrodes

1.4 SUBMITTALS

- A. Provide product submittal data on grounding electrodes and connections.

1.5 QUALITY ASSURANCE

- A. Provide grounding materials conforming to requirements of NEC and IEEE 142, and be UL labeled.
- B. Perform work in accordance with state, local, and any other applicable codes.

1.6 COORDINATION

- A. Co-ordinate grounding conductor cable routes, penetrations, etc. between interior building connections and exterior building grounding electrodes.

PART 2 - PRODUCTS

- A. ROD ELECTRODES Manufacturers:

1. Apache Grounding/Erico Inc.
2. Copperweld, Inc.
3. Erico, Inc.
4. O-Z Gedney Co.
5. Thomas & Betts
6. VFC

B. Product Description

1. Material: Copper clad steel
2. Diameter: ¾ inch
3. Length: ten (10) feet

2.2 WIRE

- A. Material shall be stranded copper
- B. Grounding electrode conductors shall be copper bare conductor
- C. Bonding conductor shall be copper bare conductor

2.3 MECHANICAL CONNECTORS

A. Manufacturers

1. Apache Grounding/Erico Inc.
2. Copperweld, Inc.
3. Erico, Inc.
4. ILSCO Corporation
5. O-Z Gedney Co.
6. Thomas & Betts, Electrical
7. VFC

B. UL Listed for grounding applications.

- C. Connectors shall be brass and suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

A. Manufacturers

1. Cadweld by Erico, Inc.
2. Engineer approved equal

- B. Exothermic connections shall utilize exothermic materials, molds, fittings, accessories, and tools for preparing and making permanent field connections between grounding system components.

2.5 GROUNDING BUSSES

- A. When and where indicated on drawings, provide copper ground busses mounted on walls in areas where special grounding needs will arise. Bus shall consist of copper bar as follows:

1. Ground bar cross section of nominal four (4) inches wide by ¼ inch thick by 24 inches in length.
2. Provide busses in Electrical Rooms and IT Rooms.
3. Drill bus to accommodate NEMA Pattern D 2-hole compression lugs for ground wires to be installed. Leave remainder of bar for future drilling by Owner.
4. Utilize copper compression lugs to connect conductors to the bar. Lugs shall be 2- hole type for double bolting to ground bar.
5. Install all bolts for compression connections with Belleville spring washers.
6. Mount grounding brackets in free air without enclosures. Install Harger WBKT-1 brackets to mount bar to wall. Isolate copper bar from mounting brackets with Harger 4200-Series two (2) inch insulators.
7. Ground bar assembly shall be Harger Lightning Protection, Inc. GBI Series, Erico, Inc. or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

- A. Remove paint, rust, mill oils, and surface contaminants at connection points.

3.3 INSTALLATION

- A. Bond all ground electrodes together to form the grounding electrode system as per the National Electrical Code and including metal underground water pipe, metal frame of the building or structure, and rod and pipe electrodes.
- B. Install grounding and bonding conductors concealed from view.
- C. Install a green equipment grounding conductor in all feeders and branch circuits, minimum size per NEC Table 250.122.
- D. Triangle Made Electrode (when shown on drawings):
 1. Tripe Ground Rod: When shown on the drawings, provide building ground rods and bond them to the electrode system. The building ground rod shall consist of three ground rods, arranged in an equilateral triangle pattern located at least five (5) feet outside an exterior building wall or as otherwise directed. Space rods 15 feet apart and drive into the earth to a point two (2) feet below finished grade to top of rods. Grounding electrode conductor shall form a continuous loop around rods, and conductor shall be properly bonded to each

rod by an exothermic weld similar to "Cadweld".

2. Extend grounding electrode conductor from this ground rod arrangement to the grounded service conductor (neutral) in the building main service panels at an accessible point on the ground bus per NEC 250-24.
3. Install grounding electrode conductor of # 3/0 Copper. Refer to drawings for final required conductor sizing.

E. Main Bonding Jumper

1. Jumper shall be sized in accordance with Section 250-66, if not indicated on the drawings, and installed within the same enclosure as the point of bonding of the system neutral service entrance. Factory installed bar type bussing bonding jumper is acceptable provided size and cross-section complies with Section 250.66.

F. Grounding Busses:

1. Provide a copper bus bar where indicated on Drawings. Provide grounding electrode conductor and connection to the grounding electrode system. Provide #1/0 AWG minimum or as indicated on the drawings.
2. Provide in each IDF and MDF room.
3. Provide at each CATV / MATV head-end mounting board.
4. Provide at each building communications rack.
5. Provide at each sound reinforcement equipment rack.

- G. Provide a water pipe electrode made up of a ten (10) foot minimum length of electrically continuous underground metal water pipe. Bond around insulating joints or sections, insulating pipe, and water meters to make pipe electrically continuous.

H. Metal Building Frame NEC 250-52

1. The structural steel or other metal frame of the building shall be effectively ground to the grounding electrode system.
2. Cadweld # 1/0 AWG bare copper cable to base of steel column. Route bonding jumper down through column blockout in building floor slab, excavate under grade beam, and extend out to a groundrod where shown on the drawings. Cadweld jumper or install Burndy Hyground™ Type YGHP-C hydraulic compression connector onto ground ring.
3. Where a building ground ring is not specified on the drawings, bond indicated building columns to driven groundrods and connect with #1/0 AWG minimum.

I. Fuel Gas Piping:

1. Each above ground portion of a gas piping system upstream from the equipment shutoff

valve shall be made electrical continuous and bonded to the building grounding electrode system, as required in NFPA 54, National Fuel Gas Code.

2. Gas piping shall not be used as a grounding electrode.
- 3.4 Ground all systems and equipment with the best applicable industry practice.
- 3.5 Utilize the main water service pipe only if it is metallic type, buried and the grounding effectiveness is established by measurement.
 - A. The point of connection to the water service shall be as near to the water meter as possible and in no case more than five (5) feet from where the water service pipe enters the building.
 - B. Provide copper wire shunt at the water meter and/or main shut-off valve.
- 3.6 Supplemental grounds shall consist of driven groundrods with connections to closest building steel column, main water pipe and ground bus of the main panels. Additionally, install a groundrod at new distribution panels, at main telephone backboard and in IT Room. Refer to drawings for additional information.
- 3.7 Install metallic raceways mechanically and electrically secure at all joints and at all boxes, cabinets, fittings and equipment. At the point of electrical service entrance, bond all metallic raceways together with a ground conductor and connect to the system ground bus. Bond all boxes as hereinafter specified for equipment.
- 3.8 Provide a separate green equipment grounding conductor in all metallic and non-metallic electrical raceways to effectively ground all fixtures, panels, controls, motors, disconnect switches, exterior lighting standards and non-current carrying metallic enclosures. Use bonding jumpers, grounding bushings, lugs, busses, etc. for this purpose. Connect the equipment grounding conductor to the building system ground. Use the same size equipment grounding conductor as phase conductors up through No. 10 AWG. Use NEC Table 250-122 for conductor size with conductors No. 8 and larger, if not shown on the drawings.
- 3.9 If any portion of a conduit run is non-metallic, then a grounding conductor shall be installed from load device continuously to the panelboard ground bar.
- 3.10 Electrical Contractor shall furnish and install a green or bare grounding conductor in each and every flexible conduit or flexible tail regardless of tails size or length. See Section 26 05 19.
- 3.11 Permanently connect the ground terminal of each receptacle to the green ground conductor contained in the metal raceway system.
- 3.12 Connect the green grounding conductor to the metal conduit with an approved grounding bushing and to the metal frame with a bolted solderless lug. Bolts, screws and washers shall be bronze or cadmium-plated steel.
- 3.13 Provide one No. 6 copper wire in 1/2 inch conduit from each main telephone backboard ground bar to the electrical system grounding electrode system.
- 3.14 Branch circuits powering computers, servers, etc. shall have a green with yellow tracer isolated grounding conductor pulled in the conduit. Isolated ground conductor shall be in addition to the

normal green bonded grounding conductor.

3.15 Other Grounding Systems:

A. Telephone and data equipment grounding connections:

1. Bond each telephone and data equipment ground (bus bar type) at each telephone terminal board and data rack back to the service entrance grounding electrode system with a bare #6 AWG ground wire.

3.16 EQUIPMENT GROUNDING SYSTEM

- #### A.
- Make a firm bond between all enclosures, equipment, and metallic raceway system. Grounding conductors shall be continuous from origin to termination and properly bonded with lugs at both ends. The metallic raceway systems shall be made up properly to form a grounding path that has an impedance back to the main system ground that is as low as can be practically obtained.

3.17 FIELD QUALITY CONTROL

A. Grounding Tests:

1. Test the electrical system after installation is complete. Inspect and test for stray currents, unintended ground shorts, and proper physical condition of grounding system. Correct any deficiencies and re-test to verify satisfactory installation.
2. Provide written test report to document all findings, test values, work done, and certification of grounding system.
3. Use true RMS meters for all voltage and current measurements.
4. Test telecommunications grounding riser to verify continuity.
5. Check all isolated ground receptacles for correct polarity.
6. Test all subpanels of separately derives systems to verify subpanel neutral is isolated from ground.
7. Verify continuity and isolation of audio system ground bus and grounding riser.
8. Perform ground resistance and continuity testing in accordance with IEEE 142.
9. When improper grounding is found on receptacle, check receptacles in entire project and correct. Perform retest.

END OF SECTION 26 05 26

DIVISION 26 SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

- 1.1 This section covers supports and supporting devices for raceways and electrical apparatus and components.
- 1.2 Summary
 - A. This Section includes the following:
 - 1. Supporting devices for electrical components and associated wiring.
 - 2. Touchup painting
- 1.3 Quality Assurance
 - A. Electrical components, devices, supports, and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - B. Comply with NFPA 70.
 - C. Comply with NFPA 101.
- 1.4 Coordination
 - A. Investigate the structural and finish conditions affecting the work and arrange work accordingly, providing such supports, fittings, and accessories as may be required to meet such conditions.
 - B. Coordinate chases, slots, inserts, sleeves, and openings and arrange in building structure to facilitate the electrical installations that follow.

PART 2 - PRODUCTS

- 2.1 Conduits shall be supported with approved conduit straps, clamps, clevis, hangers, etc. Multiple conduit runs shall be supported with trapeze structures constructed with prefabricated channel.
- 2.2 Perforated band iron, plastic or nylon ty-wraps and straps, tie wire, tape, and wooden supports will not be permitted for supporting electrical system components and wiring.
- 2.3 Angle and channel iron supports, hanger rods, chains, conduit straps, bolts, screws, nuts and washers used as parts of supports shall be galvanized or sheradized.
- 2.4 Necessary hangers, fasteners, supports, etc., appurtenant to any equipment furnished by the Owner or others for installation shall be provided, installed and connected by the Electrical Contractor without additional charge to Owner.
 - A. Supporting Devices Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

- B. Slotted-steel channel supports shall have flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.
 - 1. Channel thickness shall be selected to suit structural loading.
 - 2. Fittings and accessories shall be products of the same manufacturer as channel supports.
- C. Raceway and cable supports shall consist of manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- D. Pipe sleeves shall be ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- E. Expansion anchors shall be carbon-steel wedge or sleeve type.
- F. Toggle bolts shall be all-steel springhead type.

2.5 Touchup Paint

- A. Equipment manufacturer's paint shall be selected to match installed equipment finish.
- B. Galvanized surfaces including exposed threads shall utilize zinc-rich paint recommended by item manufacturer.

PART 3 – EXECUTION

3.1 Electrical Supporting Device Application

- A. Damp locations and outdoor installations shall utilize hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry locations shall utilize steel materials.
- C. Selection of supports must comply with manufacturer's written instructions.
- D. Strength of supports shall be adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.2 Support Installation

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze or bracket type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent

minimum in the future.

- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install ¼-inch diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving branch circuits and fire alarm circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- H. Separately support cast boxes that are threaded and connected to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- I. Install metal channel racks for mounting cabinets, control enclosures, pull and junction boxes, and other devices unless components are mounted directly to structural elements of adequate strength.
- J. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. Wood-Fasten with wood screws or screw-type nails.
 - 2. Masonry-Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 - 3. Existing Concrete-Expansion bolts.
 - 4. Light Steel-Sheet-metal screws.
 - 5. Fasteners-Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.
- K. Do not support raceways on suspended ceilings or from ceiling wire hangers. Maintain separation from accessible ceiling systems to allow for removal of support wiring, tiles, and tees.
- L. Vertical runs of EMT or rigid conduit installed within dry wall partitions shall be supported within partition immediately before entering the ceiling.
- M. Equipment including panels, enclosures, and cabinets surface mounted indoors and outdoors on building walls shall be stollod (shimmed) a minimum of one-half (1/2) inch away from the wall with channel, shims or washers. Do not mount electrical enclosures directly to walls.
- N. Support all conduits with straps, hangers and clamps to provide a rigid installation. All conduit and equipment supports shall be installed independent from other equipment and systems (ex: sprinkler pipes, ductwork and suspended ceilings) and shall be installed in a manner not to impede the ready removal of other system equipment. Flexible conduit tails will not be permitted to rest on ceiling tiles and/or on ceiling T-bars. Clipping flexible conduit tails to ceiling system suspension wires and T-bars will not be permitted.
- O. All concrete foundation supports required for electrical apparatus shall be furnished and installed

by the Electrical Contractor (except where otherwise noted) and done so in conformity with the recommendations of the manufacturer of the respective equipment and with the approval of the Architect. Free standing electrical equipment including those which are stabilized from walls shall have concrete housekeeping pads.

- P. Conduit clamps shall be used to support all conduit runs. Conduits shall be run through the ceiling joist. Such conduits shall be supported to the top side of the bottom cord of the joist unless equipment conflicts dictate that the conduits be supported higher.
- Q. Refer to "Cutting and Patching" in Section 01 73 29 of these specifications for additional information.
- R. Certain lighting fixtures and lighting fixture assemblies and accessories (plug-in raceway, etc.) may require the Electrical Contractor to design and install special support members and assemblies. Extra compensation to the Electrical Contractor for such supports will not be granted.

END OF SECTION 26 05 29

DIVISION 26 SECTION 26 05 33 - RACEWAYS AND FITTINGS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

- 1.1 This section covers raceways and fittings complete.
- 1.2 If local codes, regulations or agreements prohibit the use of any raceway system or manufactured raceway/cable assembly described in this specification or specified on drawings, Electrical Contractor shall install raceway system of superior grade with no addition to contract price.
- 1.3 Engineer or Architect shall be contacted in sufficient time to inspect below grade conduit installations immediately before backfill or concrete encasement is installed.
- 1.4 The majority of the project area is exposed construction. Therefore, MC Cable will not be acceptable in exposed construction areas on this project due to unsightly conduit supports and sagging MC Cables.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Rigid steel conduit shall be zinc-coated, heavy wall with threaded ends as manufactured by Republic, Wheatland, Triangle, or approved equal.
- B. Rigid aluminum conduit shall be heavy wall, with threaded ends as manufactured by Alcoa, Kaiser, or approved equal.
- C. Electrical Metallic Tubing (EMT) shall be zinc-coated thin wall steel as manufactured by Republic, Wheatland, Triangle, or approved equal.
- D. Flexible metallic conduit shall be aluminum tape formed into an industry standard interlocking coil as manufactured by Alflex, Eastern, Electric Flex, or approved equal.
- E. Type "MC" metal-clad power cable is not acceptable on this project.
- F. Flexible metallic liquid-tight conduit shall be galvanized steel or aluminum tape formed into an interlocking coil core with overall PVC, liquid-tight jacket. Flexible conduit shall be "Sealtite" as manufactured by Anaconda or equal by Electri-Flex.
- G. Rigid Polyvinyl Chloride Conduit (PVC) shall be heavy wall Schedule 40 as manufactured by Carlon, Cantex, Visqueen, or approved equal.

2.2 CONDUIT FITTINGS

- A. Rigid metal conduit fittings for heavy wall conduit shall be of the threaded type as manufactured by Crouse Hinds, Appleton, or approved equal. Other types of fittings shall be used when specific approval is given.
- B. EMT fittings shall be the compression type. Indenter and set screw type fittings are not acceptable. Use wrench and/or pliers to tighten compression fittings.

- C. Flexible metallic conduit fittings shall be specifically designed for use with same and shall have smooth rounded ends for wire protection. Fittings shall not reduce the inside diameter of the flexible conduit when installed.
- D. PVC conduit fittings shall be those recommended by the company whose conduit is used. Utilize solvent cement at joints for all fittings and make all fittings and joints watertight. Provide adapters for connections to metal components where required.
- E. Grounding bushings shall be phenolic lined and of malleable iron construction.

PART 3 - EXECUTION

- 3.1 Conduit shall not be less than ½" trade size including flexible conduit unless specifically noted otherwise on the drawings.
- 3.2 Conduit shall not be larger than 5" trade size unless specifically noted otherwise on the drawings.
- 3.3 Flexible metallic steel or aluminum conduit shall be minimum one-half (½) inch in trade size unless specifically noted otherwise on the drawings.

3.4 **All conduits shall run concealed where construction permits.**

Exceptions to this rule would apply in:

- A. Mechanical and Electrical Equipment Rooms.
- B. Where specifically indicated on drawings.

Note: Architect's approval is required prior to installing any conduit exposed to view in public areas.

- 3.5 Conduits installed in exposed construction joist and attic spaces shall be routed to be as unnoticeable as possible. Examples are as follows:
 - A. Conduit routed as high as possible in close proximity to the roof deck.
 - B. Conduit routed along and in contact with structural beams and joist.
 - C. Using flexible metal conduit (when approved) to keep conduit routes close and formed to and against structural members.
 - D. Installing conduit routes parallel and perpendicular to building structural members.
 - E. Painting conduit and fitting routings the same color as the structural joist space.
- 3.6 Utilize factory manufactured elbows for trade sizes 1 ½" and larger.
- 3.7 Make all cuts square with no reduction in trade size. Ream out all burrs.

- 3.8 All threaded steel conduits installed on building exterior shall have exposed conduit threads painted with zinc paint. Make all joints tight. Running threads are not accepted.
- 3.9 Provide expansion fittings for conduits crossing building expansion lines.
- 3.10 Cap all conduits with proper fittings until wires are pulled in.
- 3.11 Provide double locknuts or locknut and bushing for conduit termination. Bushings shall be insulated for conduit trade size 1¼" and larger.
- 3.12 All conduits concealed in inaccessible spaces shall be minimum ¾" trade size. (Below grade, in floor slabs, within walls and column wraps, etc.).
- 3.13 Conduits underground for service entrance and remote facilities shall be encased in minimum 3" red concrete. Conduits under finished floor slabs do not need concrete encasement.
- 3.14 Conduits installed outdoors shall be temporarily capped or plugged immediately after installation.
- 3.15 Any and all conduits installed in hollow metal stud, wood stud, and wall board partition, any movable or semi-permanent partition shall originate from ceiling. Low ceilings and walls shall be accessed from perimeter walls. Conduit stub-ups from floor slabs will not be permitted unless shown as such on drawings. No exceptions.
- 3.16 Conduits shall be firmly and securely attached to the building structure using nuts and bolts, clamps, threaded rods, etc. in order to create a rigid installation which is not subject to movement. Conduits shall be run through joist structural members and supported tight to the topside cord of the joist. Place conduit as high as possible when routed beneath structural decks. Route conduit through joist girders and joist webs. Offset conduit at solid steel beams and then rise vertically (not angling) again.
- 3.17 Conduits exiting partition walls which stop about six inches above the finished ceiling grid shall be extended upward at least two feet above the finished ceiling before turning horizontal or terminating in a junction or outlet box. This will enable ceiling tiles to be easily removed.
- 3.18 Do not use clips clamped to ceiling suspension wires or ceiling T-bars to support conduits.
- 3.19 All conduits exposed to mechanical injury, installed in hazardous areas, or above grade exterior installations shall be rigid galvanized steel material unless shown or noted otherwise on the drawings.
- 3.20 Conduits in grade slab or buried in earth shall be Schedule 40 PVC or rigid galvanized steel. EMT shall not be used in concrete slabs on grade or buried in earth (See 26 05 26 – "Grounding").
- 3.21 Conduits run within above grade concrete slabs or run overhead on the building interior may be EMT or IMC.
- 3.22 Feeder, subfeeder and service entrance conduits installed underground may be run point-to-point diagonally across the building. Such conduits shall be buried at a minimum of 24 inches below finished grade.
- 3.23 Feeder and subfeeder conduits run above hung ceilings shall run parallel with building walls and shall utilize factory bent 90° elbows. (Exception would be where Electrical Contractor runs a trapeze

supported “bank” of conduits (four or more) above a ceiling in a neat and orderly manner diagonally across the building).

- 3.24 Conduits run exposed in Mechanical and Electrical Equipment Rooms shall be run parallel and perpendicular to building wall lines.
- 3.25 Individual branch circuit conduits shall run straight at right angles and parallel with building wall lines unless specifically shown otherwise. Criss-crossing and weaving of conduits will not be permitted.
- 3.26 Service entrance conduits installed above interior floor slabs shall be encased in concrete in order that they be considered “outside” the building as per the National Electrical Code.
- 3.27 Conduits in concrete shall conform to the following:
 - A. They shall not displace structural steel.
 - B. They shall be routed so as not to cause structural weakness.
 - C. They shall have a minimum of 1” separation from any surface of the concrete.
 - D. They shall be routed in accordance with field instructions issued for extenuating conditions by the Architect. These instructions do not entitle the Electrical Contractor to additional compensation.
 - E. Conduits shall not be permitted in unreinforced concrete slabs on grade. Conduits in these locations shall be placed in gravel base beneath such slabs. Use Schedule 40 PVC or rigid galvanized steel conduit at these locations.
- 3.28 All equipment requiring motion or noise separation shall be terminated with flexible metallic conduit. Watertight flexible conduit shall be utilized at pumps, cooling towers, water treatment equipment, etc. where water spillage, spray and flooding is possible.
- 3.29 Power, light, control, and receptacle conduits in route to rooftop mounted A/C units, exhaust fans, etc. shall rise up within the units roof curb. Avoid all unnecessary roof penetrations. Co- ordinate with General Contractor.
- 3.30 Aluminum conduit shall not be embedded in concrete or earth.
- 3.31 Provide all empty conduit systems with appropriate pulling cables or fish wires even when specifications or drawings refer to conduits as “empty” conduits.
- 3.32 Flexible metallic steel conduits with field installed conductors or either “MC” cable shall be used between recessed accessible lighting fixture outlet boxes and recessed lighting fixtures unless specifically noted otherwise. Alternately, “MC” cable may be used above the accessible finished ceiling to daisy chain recessed lighting fixtures together. Hard wiring of recessed lighting fixtures (fixture-to-fixture) with EMT conduit shall be utilized above hard, inaccessible ceilings.

- 3.33 All conduits shall be installed in a neat and workmanship like manner, pleasing in appearance, and practical in application.
- 3.34 Conduit elbows required in Schedule 40 PVC conduit runs in order to terminate conduit above grade or above concrete floor line shall utilize rigid galvanized steel elbows with suitable adapters at these locations.
- 3.35 Where it is required to bend PVC conduits, Electrical Contractor shall utilize a manufactured heating box made for this purpose. Installations employing "blow torches" and similar heat sources which crystallizes and makes PVC conduit brittle will be rejected.
- 3.36 Where it is necessary to route conduit along or across exposed structural and ornamental beams, mullions, columns, joist and the roof deck enroute to outlet boxes, lighting fixtures, smoke detectors, etc., Electrical Contractor shall utilize extreme care to conceal and/or hide conduit, fittings and wiring from public view. Such conduit and wiring (including Type "MC" cable) shall be installed preferably within hollow tube beams or when not possible, mounted on top of tube beams. Matching paint colors for conduit and outlet boxes will be required by the Architect to aid raceway concealment. Electrical Contractor shall check with the Structural Engineer and Architect before drilling or burning holes in any structural members for conduit routing purposes. Refer to drawing details and notes.
- 3.37 Electrical conduits and other electrical apparatus installed by the Electrical Contractor shall be routed and placed such that there are no conflicts with roof openings for HVAC and VAV units.
- 3.38 Architectural approval is required prior to installation of any conduit exposed to view in public areas.

END OF SECTION 26 05 33

PART 1 - GENERAL

- 1.1 This section covers junction boxes, pull boxes and outlet boxes.

PART 2 - PRODUCTS

- 2.1 All boxes shall be manufactured from galvanized industry standard gauge steel, cast iron or cast aluminum. Junction boxes or pull boxes located in earth may be PVC, Schedule 40 in areas of light traffic such as pedestrian traffic. Refer to drawings.
- 2.2 When the wiring method involves threaded conduit, outlet boxes shall be cast iron or cast aluminum boxes with threaded hubs equal to Crouse Hinds Form 7, or approved equal.
- 2.3 Certain drawing installation details may require the Electrical Contractor to fabricate outlet boxes to specific specifications in order to provide an esthetic and pleasing (to view) installation as well as a structurally sturdy installation. All such boxes shall have welded seams, be ground smooth and painted to match.

PART 3 - EXECUTION

- 3.1 All boxes shall be installed in accessible areas with removable covers.
- 3.2 Outlet and pull boxes shall not be installed above inaccessible ceilings.
- 3.3 All boxes shall be firmly and securely supported from the building structure using nuts and bolts, clamps, thread rods, etc. Outlet boxes supported only by the conduit system will be rejected.
- 3.4 All outlet boxes shall be set flush with the surface of the wall, floor or ceiling in concealed installations. Provide extension rings where required. Refer to drawing details for specific requirements for wall data/telephone outlet boxes.
- 3.5 All boxes including square wireways shall conform to the NEC criteria governing the displacement and bending radius of wires and cables contained within them.
- 3.6 Provide segregated boxes with proper barriers where different services or systems are following the same routing.
- 3.7 Include all boxes required for a complete system regardless of indication on the drawings.
- 3.8 Provide pull or junction boxes to limit conduit runs to the equivalent of 360 degrees of bends and to facilitate wire pulling. Such boxes shall be sized per NEC guidelines.
- 3.9 Close up all unused openings in boxes, wireways, panelboards, etc. with approved fittings, no exceptions.
- 3.10 Provide an outlet box for each individual wiring device and communication component unless otherwise noted. See Execution paragraph of "Raceways and Conduit Fittings".

- 3.11 Multiple devices indicated at a single location shall be gang mounted under a common cover. Refer to Paragraph 3.6 above.
- 3.12 Outlet boxes made of metal dissimilar to conduit system shall not be used without permission from the Engineer.

END OF SECTION 26 05 33.1

PART 1 – GENERAL**1.1 SUMMARY**

- A. Section includes:
 - 1. Nameplates
 - 2. Underground Warning Tape
 - 3. Lockout Devices

1.2 QUALITY ASSURANCE

- A. Manufacturers shall be firms regularly engaged in the manufacture of electrical identification products of the types and sizes required and whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and standards: Comply with the following:
 - 1. National Electrical Code, NFPA No. 70.
 - 2. NEMA standards applicable to the product provided.
 - 3. UL standards applicable to the product provided.

PART 2 – PRODUCTS**2.1 MANUFACTURERS**

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - 1. Panduit Corp.
 - 2. American Labelmark Co.
 - 3. Markal Corp.
 - 4. Calpico, Inc.
 - 5. Ideal Industries, Inc.

2.2 NAMEPLATES

- A. Nameplates shall be laminated three-layer plastic with engraved black letters on light contrasting background color.
- B. Nameplates for Emergency Power Panels and Equipment shall be laminated three-layer plastic with engraved white letters on **RED** background.
- C. Letter size shall be one-quarter inch high letters for identifying individual equipment and loads.
- D. Nameplate minimum thickness shall be 1/8 inch.

2.3 UNDERGROUND WARNING TAPE

- A. Warning tape shall be six (6) inch wide plastic tape, colored yellow with suitable warning legend describing underground, buried electrical lines.
- B. Utilize detectible plastic tape when called for on the drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive -resistant mechanical fasteners, or a very good adhesive.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive resistant mechanical fasteners, or a very good adhesive.
 - 4. Secure nameplate to equipment front using screws, rivets, or a very good adhesive.
 - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
 - 6. Install nameplates for the following:
 - a. Switchboards
 - b. Distribution Panels
 - c. Panelboards
 - d. Transformers
 - e. Disconnect Switches
 - f. Motor Control Centers
 - g. Motor Starters
 - h. TVSS Units
 - i. Contactors
- C. Underground Warning Tape Installation
 - 1. Install underground warning tape along length of each underground conduit, raceway, or cable eight (8) to twelve (12) inches below finished grade, directly above buried conduit, raceway, or cable. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.
 - 2. Install line marker for underground wiring, both direct buried and in raceway.

D. Printed Panelboard Directory

1. Provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker for that panel.
2. Copy in Owner's Manual.

3.3 Above Ceiling Junction Boxes

- A. Provide a label on all above ceiling junction boxes.
1. Provide permanent labeling with indelible black marker, in neat, legible print indicating the panelboard name, branch circuit number(s), and voltage of conductors within the junction box.
 2. Provide permanent labeling with indelible red marker for all Fire Alarm System junction and outlet boxes.

3.4 Arc Flash Warning Label

- A. Switchboards, distribution panels, panelboards, transformers, and motor control centers requiring examination, adjustments, servicing, or maintenance while energized shall be field marked with adhesive tag to warn persons of arc flash hazards. Marking shall be located so as to be clearly visible to qualified persons before servicing or maintenance.

END OF SECTION 26 05 53

DIVISION 26 SECTION 26 09 23 – LIGHTING CONTROL OCCUPANCY SENSOR IN COMPUTER (LAB) CLASSROOM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers occupancy sensor lighting controls for the project's Computer Classroom Lab and the new Office Room.
- B. Occupancy Sensors include one (1) self-contained, ceiling mounted, multi-technology ultrasonic and passive infrared (PIR) units, (2) self-contained wall switch-box mounted multi-technology PIR Sensor Units, and (3) ceiling mounted multi-technology units which work with remote low voltage power packs and add-a-relay units.

1.2 SYSTEM DESCRIPTION

- A. Occupancy sensor lighting controls and associated remote power packs shall be manufactured, assembled, and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

1.3 SUBMITTALS

- A. Submittals shall be in accordance with requirements of Section 01 33 23 – “Shop Drawings, Product Data and Samples”.

1.4 QUALITY ASSURANCE

- A. To assure compatibility and consistency of operation, obtain occupancy sensors from a single source.
- B. The manufacturer will be one who has been continuously engaged in the manufacture or commercial lighting controls and occupancy sensors for no less than 10 years.
- C. Manufacturer shall be ISO-9001 certified.

1.5 WARRANTY

- A. All equipment shall be warranted free of defects in materials and workmanship.
 - 1. Warranty period shall be minimum five years from date of purchase.

PART 2 - PRODUCTS

2.1 LOW-VOLTAGE MULTI-TECHNOLOGY CEILING MOUNTED OCCUPANCY SENSORS.

- A. Low-voltage ceiling mounted occupancy sensors with multi-technology shall have the following physical, electrical and electronic characteristics:
 - 1. Sensors shall use microprocessor for motion signal analysis and internal, adaptive self-adjustment. Manual adjustment shall not be required at the time of installation or during

operation.

2. Sensors shall automatically adapt to changing room conditions.
3. Sensors shall identify, record, and learn a room's normal occupancy cycles to automatically adjust the sensitivity threshold.
4. Sensors shall save learned and adjusted settings in non-volatile memory that retains all settings during power outages.
5. Sensors shall recognize motion detected within 20 seconds of turning off lighting, as a "false off". In response to a "false off", the microprocessors shall increase sensitivity and increase the time-off setting.
6. Sensors shall recognize as a "false on" the failure. Sensors shall decrease the sensitivity in response to a "false on".
7. Sensors shall feature a 6-second time-out install test mode, which will automatically revert to standard time-out no longer than one hour after test mode is initiated. Sensors shall have manual controls and override switches to force manual adjustments.
8. Sensors shall provide a concealed bypass switch to force on lighting.
9. Sensor sensitivity shall be adjustable from 0% to 100%.
10. Sensor control knobs shall set the initial settings for automatic sensitivity adjustments.
11. Sensors shall a switch for restoring factory settings.
12. Sensor timer shall be manually selectable between 30 seconds and 30 minutes.
13. Sensors with Integral photocell shall be provided. Photocell shall prevent lighting from coming "on" when the ambient light levels are above the set point.
14. Sensors shall be equipped with tamper resistant cover.
15. All sensor controls shall be accessible from front of unit.
16. Sensor's housing shall be rugged plastic and shall be available white.
17. Sensors shall accept Class 2 wiring.
18. Sensors shall incorporate Doppler shift ultrasonic and passive infrared motion detection technologies.
19. Sensors shall mount on the ceiling.
20. Sensors shall be available in 180 degrees and 360 degrees coverage patterns.
21. Sensor infrared lenses shall have a 360 degrees field of view. Sensors shall be available in 40kHz

ultrasonic frequencies.

22. Sensors shall automatically adapt to changing room conditions including background PIR levels and continuous airflow.
23. Sensors shall have two modes of operation:
 - a. Multi-technology mode where the sensors send infrared signal to the microprocessor, which makes the decision to turn "ON" lighting based on the level of the signal.
 - b. Single technology mode where the user chooses technology that will turn "on" lighting.
24. Sensors shall incorporate a real-time motion indicator LED, which is visible from the front of the unit.
25. Sensors shall have mask inserts for PIR rejection to prevent false tripping.

2.2 MULTI-TECHNOLOGY WALL BOX MOUNTED OCCUPANCY SENSORS

- A. Wall switch mounted occupancy sensors with multi-technology shall have the following physical, electrical and electronic characteristics:
 1. Sensors shall incorporate Doppler shift ultrasonic and passive infrared motion detection technologies.
 2. Sensors shall use passive infrared to turn "ON" and either technology to keep "ON".
 3. Sensor switches shall be compatible with incandescent, magnetic or electronic low voltage, and magnetic or electronic fluorescent lighting loads, as well as motor loads.
 4. Switches shall be microprocessor controlled.
 5. Sensors shall be capable of detecting occupancy with true, 180 degrees field of view.
 6. Sensors and switches shall utilize zero crossing circuitry, which increases relay life, protects from the effects of inrush current, and increases sensor longevity.
 7. Sensor wall switches shall have integral shutters that narrow the field of view from 180 degrees.
 8. Sensors and switches shall feature pushbutton for manual "ON" and "OFF", which times out based upon occupancy detection.
 9. An LED shall indicate occupancy status.
 10. Manual range, ultrasonic sensitivity, photocell, and time settings shall be user-configurable.
 11. Switches shall be rated at 120/277V in one unit. Switch units shall fit in standard outlet boxes and use standard wallplates, which are gangable.

12. Wall switches shall not protrude more than .4 inches from face of flush box.
13. Switch coverplates shall be Decora style units with a matching wallplate available.
14. Wall switches must be available in white, ivory, almond, and gray (or equivalent colors).
15. Sensors shall be available in 40kHz ultrasonic frequencies.
16. Sensors and switches shall have "vacancy confirmation" where if a false "off" occurs, the sensors shall wait for 45 seconds to determine if space is vacant or not. If occupancy is detected within the 45 second period, either ultrasonic or passive infrared technology can immediately turn the lights back "ON". If no occupancy is detected within the 45 second period, the sensors will turn "OFF" and reset to normal operation of passive infrared on only.
17. Sensors shall use microprocessor for motion signal analysis and internal, adaptive self-adjustment.
18. Manual adjustment shall not be required at the time of installation or during operation.
19. Sensors shall automatically adapt to changing room conditions with the ability to disable adaptive features.
20. Sensors shall save learned and adjusted settings in non-volatile memory that retains all settings during power outages.
21. Maximum adapted time-out shall not exceed 30 minutes.
22. Walk through feature shall shut off lights within 2.5 minutes after momentary occupancy.
23. Sensors shall have four, selectable manual timer settings from 30 seconds to 30 minutes.
24. Switch ratings shall be as follows: 800W @ 120V, 1200VA @ 120V, 2700VA @ 277V, and 1/4HP @ 120VAC.

2.3 Power Packs associated with low voltage occupancy sensors described in paragraph 2.2 above shall have the following physical, electrical and electronic characteristics:

- A. Power packs shall be compatible with incandescent, magnetic or electronic fluorescent lighting fixtures, or LED lighting, as well as motor loads.
- B. Power packs shall utilize normally open, silver alloy dry contacts rated for a 20A load at 120V and 277V.
- C. Relay functions shall not require more than 5-ma control current to operate. Power pack's relay functions shall not require more than 5-ma control current to operate.

D. Power pack shall allow for separation of Class 1 and Class 2 wiring.

E. Power pack mounting shall be as follows:

1. Power packs shall be sized to fit inside a standard 4 x 4 junction box.

2.4 Add-A-Relay – It may be necessary to control certain loads as a result of lighting being turned “on” and “off”. In order to do this, a relay can be used which is controlled via the power pack module. Add-a-relay devices are available for this purpose as follows:

A. Relay shall be compatible with incandescent and magnetic or electronic fluorescent, LED lighting, as well as motor loads.

B. Control module shall interface with and control two- and three-wire relays from GE, Reliant and Douglas.

C. Add-A-Relay shall accept 24 VAC full-wave or half-wave rectified power.

D. Power Pack Control Module Output

1. Output for relay control shall be dry contact closure, not solid state switching.

2. Relay shall be an “ON” dry contact closure of at least 150ms when blue wire transitions from low to high.

3. Relay shall be an “OFF” dry contact closure of at least 150ms when blue wire transitions from high to low.

E. Add-A-Relay Mounting Specifications

1. Relay shall be sized to fit inside a standard, 4” x 4” junction box.

F. HVAC Relay shall be SPDT 500ma@24VDC three-wire isolated with following ratings: .5A, 125VAC; 1A, 30VDC.

PART 3 – EXECUTION

3.1 PREPARATION

A. Verify that wiring conditions, which have been previously installed under other sections or at a previous time, are acceptable for product installation in accordance with manufacturer’s instructions.

B. Inspect all material included in this contract prior to installation. Manufacturer shall be notified of unacceptable material prior to installation.

3.2 INSTALLATION

A. The Electrical Contractor shall coordinate, receive, mount, connect, and place into operation all equipment. The Electrical Contractor shall furnish all conduit, wire, connectors, hardware, and other incidental items necessary for properly functioning lighting

control and occupancy sensors as described herein and as shown on the plans. The Electrical Contractor shall maintain performance criteria stated by manufacturer without defects, damage, or failure.

1. Electrical Contractor shall comply with manufacturer's product data, including shop drawings, technical bulletins, product catalog installation instructions, and product carton instruction criteria stated by manufacturer without defects, damage, or failure.
2. The Electrical Contractor shall test that all branch load circuits are operational before connecting loads to sensor system load terminals, and then de-energize all circuits before installation.

3.3 TESTING

- A. Upon completion of all line, load and interconnection wiring, and after all fixtures are installed and lamped, a qualified factory representative shall completely check the installation prior to energizing the system. Each installed occupancy sensor shall be tested in the test mode to see that lights turn "OFF" and "ON" based on occupancy.
- B. At the time of checkout and testing, the Owner's representative shall be thoroughly instructed in the proper operation of the system.

3.4 PROTECTION

- A. Electrical Contractor shall protect installed product and finished surfaces from damage during all phases of installation including preparation, testing, and cleanup.

END OF SECTION 26 09 23

PART 1 - GENERAL

1.1 MAIN SWITCHBOARD

- A. The Main Switchboard is existing to remain intact and in service without any changes.

END OF SECTION 26 24 13

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This section covers Alterations and Additions to the project's existing basement Distribution Panelboard

PART 2 – PRODUCTS

2.1 The existing Distribution Panelboard shall consist of completed dead-front assemblies including:

- A. Bus Bars
- B. Sheet Metal NEMA 1 Enclosure
- C. Overcurrent Units (Circuit Breakers)
- D. Branch Circuit Breaker Overcurrent Units
- E. Front.
- F. Overall Front Door.
- G. UL Label

2.2 MANUFACTURER

- A. The existing Circuit Breaker Type Distribution Panel is a General Electric Type "CCB" (2 Sections).

2.3 COMPONENTS

Refer to Drawings for actual layout and location of equipment and components; current ratings of devices, bus bars, and components; voltage ratings of devices, components and assemblies; and other required details.

- A. Existing Enclosure
 - 1. Panel box is galvaneel code gauge sheet steel.
 - 2. Enclosures is surface mounted.
- B. Existing Interior Bussing
 - 1. Distribution Panelboard interiors has been designed and assembled such that circuit protective devices shall be solidly connected to the distribution panel vertical bus. The bus bars shall be attached to the feeder device by bolts and to the vertical bus by bolts and anti-turn methods.
 - 2. Circuit breaker connectors have been designed so that circuit breakers may be removed without disturbing adjacent devices.
- C. Existing Branch Overcurrent Circuit Breakers

1. Refer to Specification Section 26 28 14 – “Circuit Breakers”.
2. Main and Branch breakers shall be current rated as shown on the drawings.
3. Panelboard series connected ratings shall not be utilized on this project.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. The following procedure shall be performed by the Electrical Contractor.
 1. Verify that low voltage distribution panelboards are ready to install.
 2. Verify field measurements are as shown on Drawings.
 3. Verify that required utilities are available, in proper location and ready for use.

END OF SECTION 26 24 15

PART 1 – GENERAL

1.1 This section covers new miscellaneous lighting and power panelboards.

1.2 Scope

- A. The Electrical Contractor shall furnish and install the panelboards as specified herein and as shown on the contract drawings.

1.3 References

- A. The panelboard and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA and UL as follows:
1. UL 67 – Panelboards
 2. UL 50 – Cabinets and Boxes
 3. NEMA PB1
 4. FED. SPEC. W-P-115C
 5. UL98 – Fusible Switches

1.4 Submittals – For Approval

- A. The following information shall be submitted to the Engineer:
1. Breaker layout drawing with dimensions indicated and nameplate designation
 2. Component list
 3. Conduit entry/exit locations. (Knockouts are not permitted.)
 4. Assembly ratings including:
 - a. Short-circuit rating
 - b. Voltage
 - c. Continuous current
 5. Cable terminal lug sizes
 6. Product data sheets

1.5 Qualifications

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.6 Regulatory Requirements

- A. Panelboard overcurrent protective devices shall be selectively coordinated with all supply side overcurrent protective devices as required for this project by the National Electrical Code, NFPA 70, Articles 645.27, 700.27, 701.27 and 708.54.
- B. The panelboard shall be UL labeled.

1.7 Delivery, Storage and Handling

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

1.8 Operation and Maintenance Manuals

- A. Equipment operation and maintenance manuals shall be provided with each assembly shipped and shall include instruction leaflets, instruction bulletins and renewal parts lists where applicable, for the complete assembly and each major component.

PART 2 - PRODUCTS

2.1 Panelboard shall consist of completed dead-front assemblies including some or all of the following:

- A. Back Pan
- B. Bus Bars
- C. Sheet Metal Cabinet
- D. Normal Bonded Ground Bar
- E. Normal 100% Neutral Bussing (unless noted otherwise)
- F. Circuit Breaker Overcurrent Units
- G. Trim and Door with Metal Frame Directory Holder
- H. Isolated and insulated Ground Bar (when noted on drawings)

2.2 Manufacturers

- A. Eaton –Type “POW-R-LINE 1a”
- B. Square –D –Type “NQOD”
- C. General Electric – Type “AQ”

- 1. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer.

2.3 Ratings

- A. Panelboards rated 240 Vac or less shall have short-circuit ratings as shown on the drawings or panelboard schedules, but not less than 10,000 amperes RMS symmetrical.
- B. Panelboards rated 480 Vac shall have short-circuit ratings as shown on the drawings or

panelboard schedules, but not less than 14,000 amperes RMS symmetrical.

- C. Panelboards shall be labeled with a UL short-circuit rating. Series rated panelboards are not acceptable unless specifically designated herein or on the drawings.

2.4 Construction

- A. Interiors shall be completely factory assembled. They shall be designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
- B. Trims for branch circuit panelboards shall be supplied with a hinged door over all circuit breaker handles. Doors in panelboard trims shall not uncover any live parts. Doors shall have a semi flush cylinder lock and catch assembly. No tools shall be required to install or remove trim. Trim shall be equipped with a door-actuated trim locking tab. Equipment locking tab with provision for a screw such that removal of trim requires a tool, at the owner's option. Installation shall be tamper resistant with no exposed hardware on the panelboard trim.
- C. Surface trims shall be same height and width as box. Flush trims shall overlap the box by 3/4 of an inch on all sides.
- D. A directory card with a clear plastic cover within a metal frame shall be supplied and mounted on the inside of each door.
- E. All locks shall be keyed alike.
- F. Sheet metal cabinets shall be minimum 20" wide fabricated from industry standard gauge galvanized steel with corners lapped and fastened by approved methods. Concentric conduit knockouts in tops and bottoms of cabinets will not be permitted. Tops and bottoms shall be solid panels. Paint surface mounted cabinets with factory applied rustproofing and one finished coat.
- G. Trims and doors shall be suitable for the required mounting. Panelboards shall be door- in-door construction with both doors being hinged. When installed, the whole assembly shall present a smooth flush appearance. Provide combination catch and lock with two (2) sets of keys. All panels within same facility shall be keyed alike. Mount a clear plastic cover within a metal frame for a typewritten directory identifying each circuit inside of panel door. Finished field paint coat shall match wall covering as closely as possible for flush installations in finished areas.

2.5 Bussing

- A. Main bus bars shall be copper sized in accordance with UL standards to limit temperature rise on any current carrying part to a maximum of 65 degrees C above an ambient of 40 degrees C maximum.
- B. A system ground bar shall be included in all panels.
- C. Full-size, 100%-rated, insulated stand-off, neutral bars shall be included for panelboards shown with neutral. Bus bar taps for panels with single-pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection. 200%-rated neutrals shall be supplied for panels

designated on drawings with oversized neutral conductors. Bus bars for panels shall have current capacities as indicated on drawings and sized for such capabilities in accordance with Underwriters' Laboratories standards. The bussing shall be braced throughout to conform to industry standard practice. Phase bussing shall be full height and tapped for sequence phasing (A-B-C top-to-bottom, left-to-right and front-to-back) of branch circuit devices. Provide correct number, size and type of lugs or connectors for each phase bus, neutral bar, ground bar, isolated ground bar (where indicated), main device and branch circuit devices.

- D. Panelboards for miscellaneous power and lighting shall be in compliance with NEMA PB1.
- E. Panelboards shall be provided with the following bus design:
 - 1. Lighting and power panelboard bussing shall be 98% copper, including neutral and ground bussing.
 - 2. All bussing shall be configured for bolt-on circuit breakers.
 - 3. Voltage, number of phases and wires, size of main lug or main device (ampacity), number and position of branch circuit breakers, their rating, the number of spares and spaces and the location of breaker lock devices shall be as noted on drawings.

2.6 Circuit Breakers

- A. The minimum short-circuit rating for branch circuit panelboards shall be 10,000 amperes symmetrical at 240 volts, and 14,000 amperes symmetrical at 480 volts, or as indicated on the drawings. Panelboards shall be [fully rated].
- B. Bolt-on type, heavy-duty, quick-make, quick-break, single- and multi-pole circuit breakers of the types specified herein, shall be provided for each circuit with toggle handles that indicate when unit has tripped.
- C. All circuit breakers shall be thermal-magnetic type with common handle for all multiple pole circuit breakers. Circuit breakers shall be minimum 100-ampere frame. Ratings through 100-ampere trip shall take up the same pole spacing. Circuit breakers shall be UL listed as type SWD for lighting circuits.
 - 1. Circuit breaker handle locks (ON position) shall be provided for all circuits that supply exit signs, emergency lights, energy management control system (EMCS) panels and fire alarm panels.
- D. Main circuit breakers for lighting and power panelboards shall not occupy branch breaker positions but shall be center mounted with main trip handle movement in vertical plane.
- E. For additional circuit breaker information refer to Specification Section 26 28 14 –“Circuit Breakers” or as shown on the drawings.

- 2.7 Branch circuit breakers shall be installed at the factory in their proper locations as shown on the drawing panelboard schedules. Branch circuit breaker positions in the panelboards are not arbitrary. Electrical Contractor will be required to rearrange branch circuit breakers in panelboards which come from the factory in incorrect positions. Do not use tandem type circuit breakers. Enclosure Housing

- A. Enclosures shall be at least 20 inches wide made from galvanized steel. Provide minimum gutter space in accordance with the National Electrical Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.
- B. Enclosures shall be provided with blank ends – no knockouts.
- C. Where and when indicated on the drawings, branch circuit panelboards shall be column width type.
- D. Surfaces of the trim assembly shall be properly cleaned, primed, and a finish coat of gray ANSI 61 paint applied.

PART 3 – EXECUTION

- 3.1 Install panelboards with adequate support independent of the connecting raceways. Use Unistrut or equal to stool (shim) surface mounted panelboard enclosures away from the walls on which they are mounted.
- 3.2 Mount all panelboards level and plumb. Flush panelboards shall not extend beyond the face of the wall.
- 3.3 Protect panelboards during construction with adequate covering.
- 3.4 Insulate panelboards mounted flush on perimeter building walls with ½” solid fiberglass insulation to prevent condensation transmission.
- 3.5 Provide flush mounted panelboards with two empty 1” conduits terminating in a 411/16” box in the hung ceiling above.
- 3.6 Secure proper code clearances for all panelboard installations.
- 3.7 The Contractors shall install all equipment per the manufacturer’s recommendations and the contract drawings.

END OF SECTION 26 24 16

PART 1 - GENERAL

- 1.1 This section covers line voltage wiring devices including.
- 1.2 Wiring device installations shall comply with ADA required mounting heights.

PART 2 - PRODUCTS

- 3.2 All devices shall be specification grade, standard as per instructions for the purpose of application. All devices shall be furnished from a single manufacturer.

2.2 SWITCHES

- A. Switches for local control shall be flush tumbler type. Switches shall be Hubbell #1221 or #1223 or Pass & Seymour #PS20AC1 or #PS20AC3.
- B. They shall be rated 120 Volts at 20 Amps.
- C. They shall be colored as required to match wall background color. White walls shall receive white colored switches, not ivory.
- D. Non-standard type switches shall incorporate all applicable requirements of the standard types and shall be as indicated.

2.3 RECEPTACLES

- A. Receptacles for convenience outlets shall be specification grade, standard. Convenience receptacles shall be Hubbell #5342 or Pass & Seymour #5342. Isolated ground type duplex receptacles shall be Hubbell #IG5362 or Pass & Seymour #IG6300. Single receptacles shall be Hubbell #5361 or Pass & Seymour #5361. Isolated ground single receptacles shall be Hubbell #IG5361 or Pass & Seymour #IG5261. Ground fault (GFCI) type duplex receptacles for personnel protection shall be Hubbell #GF5362 or Pass & Seymour #2094.
- B. They shall be rated 125 Volts at 20 Amps unless otherwise noted.
- C. They shall be colored as required to match wall background color except where specifically noted otherwise. Provide chrome receptacles when mounted in mirrored areas. Provide white (not ivory) colored receptacles when mounted in white gypsum board walls.
- D. They shall be grounding type, three or more wires, single or duplex as indicated with NEMA standard face slot configuration.
- E. Non-standard type outlets and special purpose power supply receptacle shall incorporate all applicable requirements of the standard types and shall be as indicated.
- F. For each non-standard receptacle or power supply outlet installed, furnish one matching attachment plug (where required) and connect same to the cord of the associated equipment at

no additional compensation. Provide definitive grounding method for all special outlets and power supply receptacles.

2.4 PLATES

- A. Plates for all devices shall be selected as follows:
- B. They shall be same color as their associated wiring devices unless noted otherwise.
- C. They shall have correct shape opening.
- D. They shall be phenolic plastic in Service Corridors, Maintenance Areas and Office Areas unless otherwise noted. Plates shall have polished chrome finish when outlets are mounted on mirrored columns and walls.
- E. They shall be regular sized. Jumbo (oversized) size and mid-size plates will not be permitted.
- F. Plates manufactured by Arrow-Hart, Hubbell, Leviton and Pass and Seymour are acceptable.

PART 3 - EXECUTION

- 3.1 Flush floor outlet locations shall be coordinated with the Architect's floor tile pattern whenever possible. Refer to Architect's drawings.
- 3.2 Install all devices indicated complete with coverplates.
- 3.3 Where necessary, set the long dimension of the plate horizontal.
- 3.4 All devices in common enclosure shall be gang-mounted under common cover.
- 3.5 All receptacles shall maintain a consistent orientation for neutral connections. Use the silvered terminal if supplied with device.
- 3.6 Side screw terminals only shall be used when wiring switches and receptacle. Rear wiring openings shall not be utilized.

END OF SECTION 26 27 26

PART 1 – GENERAL

- 1.1 This section covers 250 volt current limiting, time delay fuses.

PART 2 – PRODUCTS

- 2.1 Circuits 0 to 600 amperes shall be protected by current limiting, dual element fuses. All dual element fuses shall have separate overload and short-circuit elements. Fuse shall incorporate a spring activated thermal overload element having a 284° F melting point alloy and shall be independent of the short-circuit clearing chamber. The fuse must hold 500% of rated current for a minimum of 10 seconds and be listed by Underwriters Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class "RK-1" or "RK-5".
- 2.2 Circuits 601 to 6000 ampere shall be protected by current limiting, time-delay fuses. Fuses shall employ "O" rings as positive seals between the end bells and the glass melamine fuse barrel. The terminals shall be peened. Fuses shall be time-delay and must hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in .01 seconds or less and be listed by Under-writers Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class "L".
- 2.3 All fuses on this project shall be the product of a single manufacturer.
- 2.4 Pressure sensitive labels shall be furnished and fastened to inside cover of each device requiring fuses indicating the type and rating of the required fuse.
- 2.5 Refer to the drawings for fuses rated above 600 volts.

PART 3 – EXECUTION

- 3.1 Provide the proper type and size fuses for all fusible devices including all equipment furnished by others.
- 3.2 Fuses shall not be installed until equipment is ready to be energized. This measure prevents fuse damage during shipment of the equipment from the manufacturer to the jobsite or from water that may contact the fuse before the equipment is installed.
- 3.3 Verify that fuse ratings match that shown on the drawings before installation.
- 3.4 Verify that fuses are installed in fuse clips tightly. Bolt-in fuses shall be wrenched tight.
- 3.5 Electrical Contractor shall furnish two spare fuses of each type and size specified for the project.

END OF SECTION 26 28 13

PART 1 - GENERAL

- 1.1 This section covers molded case circuit breakers and insulated case circuit breakers.

PART 2 - PRODUCTS**2.1 MOLDED CASE CIRCUIT BREAKERS****A. Thermal-Magnetic Circuit Breakers**

1. New molded case circuit breakers with thermal-magnetic trip shall be for installation in miscellaneous power and lighting panelboards, and distribution panels.
2. Circuit breakers shall be one, two, or three pole molded case type rated as specified herein. Breakers shall be standard construction unless noted otherwise. All circuit breakers shall be UL and CSA listed, IEC 57-1 rated, meet NEMA Standard AB1- 1975 and Federal Specification W-C-375B/GEN, when applicable.
3. Molded case circuit breakers shall have overcenter toggle-type mechanisms, providing quick-make, quick-break action. Breakers shall be calibrated for operation in an ambient temperature of 40° C. Each circuit breaker shall have trip indication by handle position and shall be trip-free. Two and three pole breakers shall have common trip.
4. Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole. Circuit breakers with frame sizes greater than 100 amperes shall have variable magnetic trip elements, which are set by a single adjustment (to assure uniform tripping characteristics in each pole). A push-to-trip button shall be provided on the cover for mechanically tripping the circuit breaker. The circuit breaker shall have reverse connection capability and be suitable for mounting and operating in any position.
5. Circuit breakers shall have removable lugs. Lugs shall be UL listed for copper and aluminum conductors. Breakers shall be UL listed for installation of mechanical type lugs, unless noted otherwise.
6. Where specified, adjustable instantaneous trip magnetic only circuit breakers shall be furnished. Each instantaneous breaker shall be provided with a single magnetic adjustment, which simultaneously sets the magnetic trip level of each individual pole.
7. Series rated, UL listed circuit breaker pairs are not acceptable on this project and will be rejected.

B. ELECTRONIC TRIP CIRCUIT BREAKERS

1. Refer to the drawings for information on where and when to utilize electronic trip circuit breakers.

PART 3 - EXECUTION

- 3.1 Verify that termination lugs are compatible with conductor type and size.

- 3.2 Verify that all terminations are tight.
- 3.3 Make a permanent record of the adjustable magnetic settings and affix to the breaker case.
- 3.4 Verify that the push-to-trip feature is operable and that the trip indication operates.

END OF SECTION 26 28 14

DIVISION 26 SECTION 26 28 17 – ENCLOSED SAFETY DISCONNECT SWITCHES

PART 1 – GENERAL

1.1 SCOPE

- A. This section covers individually mounted, low-voltage fused and non-fused enclosed Safety Disconnect Switches as specified herein and as shown on the contract drawings.

1.2 REFERENCES

- A. The switches and all its components shall be designed, manufactured and tested in accordance with the latest applicable standards:
 - 1. NEMA KS-1
 - 2. UL 98

1.3 SUBMITTALS

- A. The following Disconnect Switch information shall be submitted to the Engineer:
 - 1. Dimensioned outline drawing
 - 2. Conduit entry/exit locations (Knockouts are Not Permitted)
 - 3. Switch ratings including:
 - a. Short-circuit rating
 - b. Voltage and number of poles
 - c. Continuous current rating
 - 4. Fuse ratings and type
 - 5. Cable terminal sizes
 - 6. Product data sheets

1.4 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

1.5 REGULATORY REQUIREMENTS

- A. Safety Disconnect Switches shall bear a UL label.

- B. DELIVERY, STORAGE AND HANDLING Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Eaton
- B. Square –D/Schneider
- C. General Electric
- D. Engineer Approved Equal

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.2 HEAVY-DUTY SAFETY DISCONNECT SWITCHES

- A. Provide switches as shown on drawings, with the following ratings:
 - 1. 30 to 1200 amperes
 - 2. 250 volts ac to 600 volts ac
 - 3. 2, 3, 4 and 6 poles
 - 4. Fusible and non-fusible
 - 5. Mechanical lugs suitable for aluminum or copper conductors.
- B. Construction
 - 1. Switch blades and jaws shall be visible and plated copper.
 - 2. Switches shall have a handle that is easily pad-lockable with three 3/8-inch shank locks in the OFF position.
 - 3. Switches shall have defeatable door interlocks that prevent the door from opening when the handle is in the ON position (except for double-throw switches). Defeater mechanism shall be front accessible.
 - 4. Switch assembly and operating handle shall be an integral part of the enclosure base.
 - 5. Switches rated 30 A to 1200 A shall have reinforced fuse clips.
 - 6. Switch blades shall be readily visible in the "ON" and "OFF" position.
 - 7. Switch operating mechanism shall be non-teasable, positive quick-make/quick-break type. Bail type mechanisms are not acceptable.
 - 8. Fusible switches shall be convertible and suitable as service entrance equipment.
 - 9. Switches shall have line terminal shields.
 - 10. Switches shall be suitable for systems capable of 200 kA at 480 V with Class J, L, R, or T fusing as applicable for single-throw switches.
 - 11. Embossed or engraved ON-OFF indication shall be provided.
- C. Enclosures

1. All enclosures shall be NEMA 1 Heavy Duty unless otherwise noted.
 - a. Other available types, where noted, shall be: NEMA 3R rainproof
 - b. NEMA 4X watertight corrosion-resistant
2. Paint color shall be ANSI 61 gray.

2.3 NAMEPLATES

- A. Nameplate shall be front cover mounted, containing a permanent record of switch type, ampere rating, and maximum voltage rating.

PART 3 – EXECUTION

3.1 FACTORY TESTING

- A. Standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

3.2 INSTALLATION

- A. The equipment shall be installed per the manufacturer's recommendations and all NEC and local code requirements.

3.3 Install fused or non-fused disconnect switches were indicated on drawings or where required by codes.

3.4 Switches shall be installed with adequate hand access to and clearance for operation and fuse replacement.

3.5 Switches shall be supported independent of the raceway system and shall not be mounted on HVAC ductwork. Securely support switches from building structural members.

3.6 Switches installed for unit heaters, water heaters, motors, etc. shall be mounted at approximately 5'-0" A.F.F. for easy accessibility unless noted otherwise on the drawings. Only switches for above ceiling duct heaters, etc. may be mounted above hand reach.

END OF SECTION 26 28 17

PART 1 – GENERAL**1.1 SUMMARY****A. Sections Includes:**

1. This section covers a downstream Surge Protective Device (SPD) utilized to protect the T.L. James Building basement area electrical loads from electrical power surges.
2. Surge Protective Device (SPD) shall be individually standalone mounted. Do not mount SPD units within Distribution Panels or Panelboards.

1.2 REFERENCES**A. Institute of Electrical and Electronics Engineers:**

1. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment.
2. IEEE C62.41 – Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
3. IEEE C62.45 – Guide on Surge Testing for Equipment connected to Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:

1. NEMA LS 1 – Low Voltage Surge Protection Devices.

C. National Fire Protection Association

1. NFPA 70 – National Electrical Code.
2. NFPA 780 – Standard for the Installation of Lightning Protection Systems.

D. Underwriters Laboratories Inc.:

1. UL 1283 – Electromagnetic Interference Filters.
2. UL 1449 (Third Edition) – Transient Voltage Surge Suppressors.

1.3 SUBMITTALS**A. Submit SPD capacity, dimensions, weights, details, and wiring configuration.****B. Test Reports:**

1. Indicate Let-Through voltage test data.
2. Submit spectrum analysis of each unit.

C. Submit test reports from nationally recognized independent testing laboratory verifying

suppressors can survive published surge current rating. Manufacturer's shall submit installation instructions and connection requirements.

- D. Manufacturer's Certificate shall certify transient voltage surge suppression device complies with UL 1449 Second Edition Surge Voltage Ratings.

1.4 QUALITY ASSURANCE

- A. List individual units under UL 1449 (Third Edition) and UL 1283.
- B. All SPD equipment of each type shall be the product of one manufacturer.
- C. SPD shall comply with NEC Article 285 and shall be permanently marked with the short circuit current rating of the device.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept equipment on site in factory packaging. Inspect for damage.
- B. Protect equipment from damage by providing temporary covers until construction is complete in adjacent space.

PART 2 – PRODUCTS

2.1 SURGE PROTECTIVE DEVICE (SPD)

- A. Manufacturers:
 - 1. Current Technology
 - 2. Liebert
 - 3. Advanced Protection Technologies/Siemens
 - 4. Square D/Schneider #EMA22
 - 5. LEA International
 - 6. GE
 - 7. Engineer Approved Equal
- B. Surge Protective Devices (SPD) for protection of line voltage electrical circuits.
- C. Unit Operating Voltage shall be as indicated on drawings.
- D. Maximum continuous operating voltage shall not be greater than 115 percent of nominal system operating voltage.
- E. Metal Oxide Varistors
 - 1. Equally distribute surge current to Metal Oxide Varistor (MOV) components to ensure equal stressing and maximum performance. Furnish surge suppression platform with equal impedance paths to each matched MOV.
 - 2. Internal Connections shall be made with hardwired with connectors using low impedance conductors and compression fittings.

- a. Safety and diagnostic monitoring units shall be equipped with standard overcurrent protection: Continuous monitoring of fusing system.
 - b. Monitor individual MOVs (including neutral to ground). Units shall be capable of identifying open circuit failures not monitored by conventional fusing systems.
 - c. Units shall provide for monitoring for overheating in each mode due to thermal runaway.
- 3. Labeling shall be permanently affix UL 1449 (Third Edition) suppression voltage ratings and CSA to unit.
- F. Types:
 - 1. Locate SPD as standalone (not within electrical gear) as shown on the drawings. SPD unit shall be housed adjacent to protected panelboard.
- G. Rating:
 - 1. Furnish each unit with high performance EMI/RFI noise rejection filter. Electric line noise attenuation no less than 45 dB at 100 kHz using MIL-STD-220A insertion loss test method.
- H. Required Accessories:
 - 1. Digital display transient surge event counter with manual reset.
 - 2. Green and red solid state indicator light on each phase. Absence of green light and presence of red light indicates which phases have been damaged. Fault detection activates flashing trouble light. Units not capable of detecting open circuit damage, thermal conditions, and over current will not be accepted.
 - 3. Local audible alarm.
 - 4. Form C dry contacts one normally open (NO) and one normally closed (NC) for remote status monitoring.
 - 5. Push-to-test feature.
 - 6. Replaceable MOV's.
- I. Total surge current capacity (based on 8 x 20 microsecond waveform) shall be capable of surviving not less than:

Application	Min Surge Current per Phase	Min Surge Current per Mode*
Lighting and Miscellaneous Power Panelboards	120 kA	60 kA
L-G, L-N, and N-G (WYE system)		

- J. For Wye configured system, furnish device with directly connected suppression elements between line-neutral (L-N), line-ground (L-G), and neutral-ground (N-G). For Delta configured system, furnish device with suppression elements between line to line (L-L) and line to ground (L-G).

- K. Do not exceed the following for maximum UL 1449 (Third Edition) suppression voltage ratings:

Modes	208Y/120	480Y/277
WYE – L-N; L-G; N-G	400 V	800 V

- L. ANSI/IEEE Catalog C3 Let Through Voltage shall be based on ANSI/IEEE C62.41 and C62.45 recommended procedures for Catalog C3 surges (20 kV, 10kA) and not less than:

Modes	208Y/120	480Y/277
L-N	500 V	900 V

- M. ANSI/IEEE Catalog B3 Let Through Voltage shall be based on ANSI/IEEE C62.41 and C62.45 recommended procedures for ANSI/IEEE Catalog B3 Ringwave (6 kV, 500 amps) not less than:

Modes	208Y/120	480Y/277
L-N	170 V	300 V

- N. Enclosure Construction

1. NEMA 1 Metal Housing
2. Approximate size – 12"x12"x6"D
3. Screw-on front cover

2.2 SOURCE QUALITY CONTROL AND TESTS

- A. Test units to specified surge ratings to ensure devices will achieve required life expectancy and reliability. Testing to full ratings also verifies internal construction quality of suppressors. Provide withstand testing for each mode and each phase basis.
- B. Perform actual Let-Through voltage test data in form of oscillograph results for ANSI/IEEE C62.41 Catalog C3 (20 kV, 10 kA), Catalog C1 (6 kV, 3 kA), and Catalog B3 (6 kv, 500 A at 100 kHz) tested in accordance with ANSI/IEEE C62.45.
- C. Perform spectrum analysis of each unit based on MIL-STD-220A test procedures between 50 kHz and 200 kHz verifying device noise attenuation exceeds 45 dB at 100 kHz.
- D. Perform test verifying suppressors can survive published surge current rating for each mode and each phase basis. Test wave based on ANSI/IEEE C62.41, 8x20 microsecond current wave.
- E. Submit letter of certification from factory indicating compliance.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify mounting area is ready for equipment.
- B. Verify circuit rough-ins are at correct location.

3.2 INSTALLATION

- A. Install in accordance with IEEE 1100.
- B. Install service entrance suppressors in switchboard.
- C. Install suppressors for panelboards adjacent to panel.
- D. Include surge counter for standalone TVSS.
- E. Install with maximum conductor length of 36 inches. Install suppressor with internal fusing.
- F. Provide 30 amp, 3 pole circuit breaker in panelboards to feed TVSS/SPD units when shown on the drawings.

END OF SECTION 26 43 00

DIVISION 26 SECTION 26 51 14 – LIGHTING FIXTURES, LEDS, DRIVERS AND ACCESSORIES

PART 1 - GENERAL

- 1.1 This section covers new indoor and outdoor building mounted LED lighting fixtures, drivers, associated lenses, accessories and supports necessary for normal general illumination.
- 1.2 All new lighting fixtures will be utilized to remodel the existing T.L. James Hall basement Computer Classroom and other basement Lab areas.
- 1.3 QUALITY ASSURANCE
 - A. Comply with applicable codes.
 - B. Comply with applicable sections of Division 26: Electrical.
- 1.4 SUBMITTALS
 - A. Submit product data, shop drawings, samples and drawings in accordance with Section 26 05 00 – “Electrical”.
 - B. Prepare submittals and approval notations for general conformance to intent of lighting design. Electrical Contractor is responsible for dimensions, quantities, mounting accessories, methods of construction, coordination with architectural elements and compliance with contract documents and applicable codes.
 - C. Indicate fixture type, manufacturer’s name, catalog numbers, fixture specifications, mounting details, finishes, dimensions, accessories, LEDs to be used and evidence of UL label or other acceptable approval.
 - D. Submit photometrics for all proposed substitutions. Photometrics must include independent testing laboratory report, calculated according to IES standards, showing:
 - 1. Candela distribution curves and tables in five-degree increments, for lengthwise and crosswise planes through fixture.
 - 2. Zonal lumen summary.
 - 3. Efficiency.
 - 4. Spacing ratios.
 - 5. LED shielding angles.
 - 6. Coefficients of utilization.
 - 7. Average and maximum luminances at pertinent viewing angles.
 - 8. Table of visual comfort probabilities, where applicable.

- E. Submit shop drawings for all non-standard products. Submit number of prints as described by Architect.
- F. Electrical Contractor shall submit manufacturer's catalogue specification sheets for approval for all standard catalogue light fixtures prior to purchase of the same.
- G. By approving and submitting shop drawings, product data, samples and similar submittals, the Electrical Contractor represents that he has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the work and of the contract documents.

1.5 GUARANTEE

- A. All work performed under this section must be guaranteed to be free of defects in products or workmanship for one year after date of notice of final acceptance by Owner, unless noted otherwise in General Conditions.

PART 2 - PRODUCTS

- 2.1 Provide fixtures as indicated in Lighting Fixture Schedule. If conflict exists between Lighting Fixture Schedule and specifications, specifications will generally take precedence.

- 2.2 Provide lighting fixtures new and complete with mounting accessories, junction boxes, trims and LEDs.

- 2.3 Provide products with UL labels, or other acceptable approvals, appropriate to mounting conditions.

- 2.4 All products of same type shall be by same manufacturer.

- 2.5 Architect and Engineer are final judge of whether proposed substitution fixture is acceptable.

2.6 FIXTURE CONSTRUCTION

- A. Sheet metal shall be minimum 20 gauge cold-rolled steel, with welded joints. Exposed weld marks and seams shall be filled and ground smooth.
- B. Extrusions shall be minimum 1/8" wall thickness, smooth and free of tooling lines, with cast end plates and joiners.
- C. Casting shall be smooth, free of pits, scales or blemishes.
- D. Spinings shall be smooth, free of spinning lines, with clean, finished edges.
- E. Back plates and housings shall be constructed to prevent light leaks.
- F. Exposed end plates and joiners shall be provided with concealed fasteners.
- G. End-to-end mounted fixtures shall be provided with proper joiners, aligning splines and trims.

- H. Mounting frames shall be galvanized frames for installation in damp locations or in plaster ceilings to prevent rusting. Fixtures in non-accessible ceilings shall provide access to junction boxes, drivers and transformers through fixture aperture openings.
- I. Recessed adjustable fixtures shall be provided with rotation and tilt locking devices.
- J. All fixtures with removable covers or cones shall be supplied with safety chains securely attached to main housings. There shall be a sufficient quantity of safety chains to support total weight of fixture.

2.7 PENDANTS

- A. Stem mounted fixtures shall be provided with ball swivels to permit true vertical installation. Flat canopies shall be minimum ½" deep.
- B. Cable-mounted fixtures shall be provided with 3/32" stainless steel airplane cable, with concealed end hardware.
- C. Power feed point shall be a flat canopy to cover outlet box with holes to support cable and power cord.
- D. Power cord shall be straight white 3-conductor cord run parallel to support cable and on centerline of fixture cross-section. Do not tie power cord to support cable.
- E. Non-power feed points shall be a ½" o.d. cable end sleeve, inside threaded ¼"-20, with flat plate to cover hole in ceiling.
- F. Top of cable shall be provided with ball swaged on end to fit inside sleeve.
- G. Electrical Contractor to provide ¼"-20 stud projecting ¾" below ceiling with support above ceiling as noted.
- H. Supports shall carry fixture weight to structure, and provide bracing to ceiling suspension to prevent sideways shifting.
- I. Pendants must permit +/- ½" vertical adjustment after installation.
- J. Finishes of fixtures shall be as noted. Canopies, stems and sleeves shall be painted to match ceiling. Airplane cables shall be unpainted.

2.8 TRIMS

- A. Trims must fit tightly with no gaps or light leaks.
- B. Aluminum parabolic reflectors, louvers and cones shall be smooth, properly shaped and with diffused finish in colors as indicated.
- C. Hot spots and images shall not be visible at angles shallower than LEDs shielding angle.
- D. Self-flange cones must bend parallel to ceiling and cover ceiling hole without additional trim ring.

- E. Lenses and diffusers shall be glass or virgin acrylic as noted with patterns as indicated. Lens shall have a minimum thickness of 1/8". No exceptions.
- F. Lens over 4'-0" long shall be cut in equal-length pieces.
- G. Cross-baffles shall be straight, parallel with no variation in cell sizes. Sections must align end-to-end and be cut to present unbroken appearance.
- H. Plastic parabolic louvers shall be molded acrylic with specular silver finish with cell sizes as noted.
- I. Integral molded flange on all sides of louver shall be cut to fit fixture door.

2.9 FINISHES

- A. Factory painted finishes shall be air-cured urethanes or baked-on enamels with acrylic, epoxy or polyester base.
- B. Prepare surfaces properly and use primers suitable to painting system and installation location.
- C. Exterior finishes using sheet steel shall be electrogalvanized before priming. Use urethane or polyester-base paints only. Manufacturer and/or Electrical Contractor shall be responsible that all fixtures specified for exterior use shall be treated with a weather-resistant corrosion protective coating.
- D. Apply paints evenly with no runs, orange-peel or dirt marks.
- E. Dry film thickness shall be 1.25 mils minimum.
- F. Semi-gloss finish is required unless noted otherwise.
- G. White finishes shall have 85% minimum reflectance.
- H. Custom-color fixture finish samples shall be submitted as previously noted.
- I. Decorative metals (brass, bronze, copper, etc.) shall be provided with clear protective coating, baked-on lacquer or air-cured urethane as described above.
- J. Unpainted aluminum shall be provided with anodized finish, clear or in colors as selected.
- K. Refer to Lighting Fixture Schedule for fixtures to be field-painted. Verify compatibility of field paint to factory finish and surface operating temperature.
- L. Field paint all cover plates and white trim rings to match adjacent surfaces. If trims are plastic, lightly sand before painting to ensure paint adhesion. Do not field paint any portions of self-flange cones.
- M. Satin finish is required unless noted otherwise.

2.10 LED LIGHTING, DRIVERS AND ACCESSORIES

1. LED LIGHT SOURCE New LED lighting fixtures shall provide a Visual Comfort Probably (VCP) of 70 or higher.
2. LED chip life shall approach 60,000 hours.
3. Interior LED Color Temperature shall be 3500K nominal with a CRI>70 unless noted otherwise on the Lighting Fixture Schedule. Exterior fixture color temperature shall be Cool White (CW), 4000K.
4. Luminaire LED system components shall be low copper aluminum, with high performance heat sink(s) designed specifically for LED luminaires. No active cooling features (fans, etc.). Luminaire configuration must allow for modular upgradability and/or field repair of all electrical components (i.e. LED modules, Driver(s), etc.). Drivers and vertical light bars must be all mounted to a twist-lock tool-less assembly for ease of installation and trouble shooting.
5. Governmental Standards shall be LM79 and LM80 Compliant.
6. Expected LED Life Rating shall be (L70 B10) to be 60,000 hours to 100,000 hours; defined as time of operation (in hours) to 30% lumen depreciation (i.e. 70% lumen maintenance), derived from luminaire temperature measurement testing (i.e. LED chip package temperature (TS) measurement obtained with the LED chip package operating in given luminaire and in a given stabilized ambient environment) under UL 1598 environments and directly correlated to LED package manufacturers IESNA LM- 80-08 data. Predicted (L70 B10) Limits @ 25°C luminaire ambient operating environment): Greater than 60,000 hours @ 350mA Drive Current.

B. DRIVERS AND TRANSFORMERS

1. Provide LED drivers with temperature ratings suitable for project operating conditions. Certain “smart” LED drivers will have dmx control capability.
2. Provide drivers with best-made sound ratings and mount securely to prevent vibration.
3. Bolt drivers and transformers securely to fixture housing, using all available mounting holes.
4. Replace excessively-noisy drivers or transformers at no cost to Owner.
5. Remote drivers or transformers shall be provided with suitable enclosures and mounting hardware, and installed in accessible, ventilated locations.
6. Verify input voltages and match to branch circuit voltages.
7. PCBs shall not be used in capacitors.
8. Drivers shall be solid state, electronic, high power factor, CBM-certified with maximum 10% total harmonic distortion.
9. Drivers must meet applicable efficiency standards.
10. Remote Low-Voltage Transformers shall be provided with replaceable fuses on secondary sides.

11. LED drivers must have heat removable sinks capable of properly dissipating heat.
12. Line Voltage – Universal Voltage 120-277 volts.
13. Driver Components must be fully encased in potting material for moisture resistance and must comply with IEC and FCC standards.
14. Surge Protection must be provided including separate surge protection built into electronic driver.

2.11 WIRING

- A. Provide branch circuit and fixture wiring with insulation suitable for temperatures in and around fixtures.
- B. All fixtures shall be grounded per NEC.

PART 3 - EXECUTION

3.1 PREPARATION AND COORDINATION

- A. Locate lighting fixtures in accordance with architectural reflected ceiling plans.
- B. Confirm adequacy of architectural cove length, width and height dimensions to house and conceal specified cove lighting fixtures.
- C. Coordinate with other trades. Location of lighting fixtures has priority over location of new framing (except major structural members), ducts, diffusers, sprinklers, speakers, smoke detectors, and other obstructions. If obstructions are encountered which prevent installation of lighting according to drawings, notify Architect and do not proceed until conflict has been resolved.

3.2 INSTALLATION

- A. Where fixtures are indicated for installation on surface mounted low-density cellulose fiberboard, provide 1½ inch ceiling spacers, unless UL approved for mounting directly to the ceiling material.
- B. Provide adequate backing and support for outlet boxes so fixtures can be installed properly.
- C. Install lighting fixtures securely, level, plumb, aligned and in straight rows. Lighting fixtures must be installed so they do not shift during relamping or adjustment.
- D. Properly support and align lighting fixtures and provide all necessary steel shapes for support of the fixtures. Where local code ordinances require, provide independent support for each fixture. Co-ordinate complete fixture installation with the building's construction.
- E. Provide seismic supports and bracing per code. Refer to Section 26 05 29 – “Hangers and Supports for Electrical Systems” for additional information.
- F. Minimum width fixture trims are specified for this Project. Cut holes to follow fixture housings

exactly so no gaps will be visible after trims are installed.

- G. Lighting fixture enclosures (tee-pees and bonnets) for installation over fixtures in fire rated ceilings shall conform to UL and lighting fixture manufacturer's requirements. Such enclosures shall be installed by the Electrical Contractor when required by codes.
- H. Install bottom of housing aligned with finished ceiling.
- I. Verify all ceiling systems and co-ordinate fixture type and accessories prior to ordering fixtures. Coordinate and co-operate with ceiling supplier in the preparation of ceiling shop drawings.
- J. Should any recessed mounted type lighting fixture have a gross weight of such amount to cause T-bar and/or grid ceiling sag or T-bar grid rotation (unsafe mounting) then the Electrical Contractor shall support such fixtures independent of the T-bar grid system. Extra compensation to the Electrical Contractor for such added supports will not be permitted.
- K. Keep ceiling insulation at least 3" away from fixture.
- L. Install trims and surface mounted fixtures after painting of spaces.
- M. Install trims tightly with no gaps or light leaks.
- N. In spaces with parallel rows of light tracks, locate feeds and orient tracks so all neutral conductors face the same way.
- O. Clean fixtures and remove plaster and paint spatters.
- P. Verify that fixtures and lighting controls are working at time of final acceptance by Owner.
- Q. Test emergency lighting system.
- R. Test that all occupancy sensors are working properly.

3.3 STARTUP AND CHECKOUT FOR LIGHTING SYSTEMS

- A. As part of the effort of installing interior Lighting Fixture Systems, the Electrical Contractor shall include in his bid price a minimum of one (1) jobsite visits by a factory startup technical representative. The Factory Startup Representative shall do the following while at the jobsite:
 - 1. Survey the installation site and verify that light fixtures are being mounted in a proper factory authorized manner.
 - 2. Verify that any and all necessary specialty outlet boxes that may be required by the manufacturer are installed and configured properly to accept all conduits, power wiring, and signal cabling.
 - 3. Verify that all signal cabling installed fixture-to-fixture (if any) and fixture homerun signal cabling (if any) is being installed properly and terminated correctly.
 - 4. Verify that proper polarity connections are being made correctly.

5. Verify that end-of-line resistors (if any) are located properly.
6. Utilize proper startup testing equipment to determine and verify that all communication signal cables are transmitting properly and that any and all “shorts”, “opens”, and “mis-wiring connections” by the factory or the electrician are corrected.

END OF SECTION 26 51 14

DIVISION 26 SECTION 26 52 00 - BATTERY PACK EMERGENCY LIGHTING AND EXIT LIGHTING

PART 1 - GENERAL

- 1.1 This section covers battery operated emergency lighting fixtures and exit sign lighting.
- 1.2 Emergency illumination shall include all required exit sign lights and all other light fixtures necessary to provide sufficient Life Safety emergency egress illumination as per codes.
- 1.3 Emergency lighting system shall be so designed and installed that the failure of any individual lighting element, such as the burning out of a light bulb, cannot leave any space in total darkness.

PART 2 - PRODUCTS

- 2.1 "Products" paragraphs under "Lighting Fixtures, LEDs, Drivers and Accessories" - Section 26 51 14 of these specifications shall apply to all emergency and exit light fixtures furnished and installed for emergency illumination.
- 2.2 Lighting fixtures and exit sign fixtures installed for emergency life safety lighting shall be designed and configured to be automatically connectable to an emergency power supply in the event of a normal power outage.
- 2.3 Stand-alone Emergency Lighting Fixtures and Exit Signs
 - A. Each emergency light fixture and exit sign light fixture shall be required to have a battery- inverter-charger system designed to provide the fixture with an alternate, backup source of battery power should the normal power supply fail. These fixtures shall operate as follows:
 - 1. A solid state charging circuit shall be provided to charge the battery(s). An indicator pilot light and test switch shall be provided.
 - 2. A load transfer relay shall be provided to switch the emergency lamp load from normal source to the battery-inverter emergency source.
 - 3. Batteries shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1½ hours. Rechargeable maintenance free battery(s) shall be designed and constructed to meet the requirements of emergency service. The battery as well as the entire fixture shall be unconditionally guaranteed for three (3) years from the date of building acceptance.
 - B. The fixture battery pack can be designed to operate only one LED lamp of a multiple lamp fixture or it can be designed to upgrade additional remote mounted fixture heads.
 - C. Lighting fixtures with integral battery-inverter-charger systems shall be Lithonia "EL" series or approved equal.

PART 3 – EXECUTION

- 3.1 Electrical Contractor shall install emergency and exit lighting fixtures and accessories as indicated by Contract Drawings and as required by applicable codes.

- 3.2 "Execution" paragraphs under "Building Lighting" Section of these specifications shall apply to all emergency and exit fixtures furnished and installed for emergency illumination.

END OF SECTION 26 52 00

DIVISION 27 SECTION 27 10 00 – COMMUNICATION WIRING AND HARDWARE FOR TELEPHONE AND COMPUTER/DATA SYSTEMS

PART 1 - GENERAL

- 1.1 This section covers panels, components, power and signal cable wiring, connecting/ termination hardware and programming for the project's telephone and computer/data communication systems.
- 1.2 Electrical Contractor and his Special Systems Vendor shall coordinate with the local telephone company and abide by their rules and regulations.

1.3 RELATED WORK

- A. 16110 — Raceways and Fittings
- B. 16130 — Boxes
- C. 16140 — Wiring Devices
- D. 16190 — Support Devices
- E. 16450 — Grounding

1.4 DESCRIPTION

A. Summary of Work:

- 1. Provide a complete and tested Signal Cabling System (SCS) for the interconnections of the Local Area Network (LAN) as necessary. The SCS shall include fully terminated unshielded twisted pair cables, raceways, conduit, back boxes, station mounting hardware, patch panels, relay racks/cabinets, and other incidental and miscellaneous premises wiring system hardware as required for a complete, tested, and usable system that is in compliance with the latest NEC, ANSI/EIA/TIA, BICSI, and Authorities Having Jurisdiction codes and standards. The installation shall comply with all applicable requirements, design guidelines, and standards presently being used at the jobsite and as indicated on the Drawings and in the Specifications.
- 2. If there are any discrepancies between the drawings and Specifications or among themselves, the Electrical Contractor and/or his Special Systems Vendor shall request clarification prior to continuing the work.

1.5 QUALITY ASSURANCE

A. Acceptable Manufacturers

- 1. The equipment/products described herein, and furnished per these Design Standards shall be the product of one manufacturer. All references to model numbers and other detailed descriptive data is intended to establish standards of design performance, and quality, as required.

B. Installer Qualifications

- 1. The Electrical Contractor's signal cable system installer/vendor shall be licensed and shall

meet all applicable regulations of the local and state authorities insofar as they apply to this type of system. The installer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten (10) large- scale projects and contact names confirming successful Category 6A premises wiring system installations.

2. The installing Vendor must have a full-time employed RCDD (Registered Communications Distribution Designer) on staff. Current RCDD certification shall be provided in the product submittals.
3. All individuals installing the SCS must be employees of the certified installer. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the Electrical Contractor's Vendor product submittals.

C. Pre-Construction Meeting

1. The Electrical Contractor's Low Voltage Vendor installer shall attend a mandatory pre-construction meeting with the Owner's Project Manager, and individuals deemed necessary prior to the start of the work. SCS work shall not commence prior to this meeting.

D. Acceptance

1. The Owner's Project Manager reserves the right to reject all or a portion of the work performed either on technical or aesthetic grounds.

E. Warranty

1. The Electrical Contractor's system installer shall be a certified installing Low Voltage Vendor of product and hold current certification. Electrical Contractor's Low Voltage Vendor shall provide a 25-year end-to-end performance warranty on all products installed. The proposer shall provide current certification documentation. The performance warranty shall be issued by the manufacturer and shall warrant that all Category 6A cable (required) links have been tested bi-directionally (end-to-end) using a Level 2 or better tester, per TSB-67, and that all test results conform to the most current TIA/EIA-568-A and/or TSB-67 Link values.
2. The warranty shall stipulate that all products used in this installation meet the prescribed mechanical and transmission specifications for such products as described in ISO/IEC 11801, ANSI TIA/EIA-568-A, or EN 50173. Quality and workmanship evaluation shall be solely by the Owner's Project Manager, Architect and the Engineer.

1.6 REGULATORY REQUIREMENTS

- A. All work shall be performed in accordance with the latest revisions of the following standards and codes:
1. Latest Local Codes and Amendments
 2. National Electrical Code

3. Other References: TIA/EIA-568-B Commercial Building Telecommunications Wiring Standard
 4. EIA/TIA-569 Commercial Building Standard for Telecommunication Pathways And Spaces
 5. TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 6. TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications
 7. TIA/EIA TSB 67 Transmission Performance Specification for Field of Unshielded Twisted-Pair Cabling Systems
 8. ISO/I EC 11801 Generic Cabling Standard
 9. EN 50173 Generic Cabling Standards for Customer
- B. If the requirements of these Design Standards or the Project Drawings exceed those of the governing codes and regulations, then the requirements of these Design Standards and the Drawings shall govern. However, nothing in the Drawings or Design Standards shall be construed to permit work not conforming to all governing codes, regulations, and manufacturer installation requirements.

1.7 ABBREVIATIONS

A. The following abbreviations are used in this document:

1. DC Direct Current
2. IDF Intermediate Distribution Frame
3. MDF Main Distribution Frame
4. PBX Private Branch Exchange
5. UTP Unshielded Twisted Pair
6. EMT Electrical Metallic Tubing
7. RMC Rigid Metallic Conduit
8. RNC Rigid Non-Metallic Conduit

1.8 SUBMITTALS

A. Project Initiation

1. Within fourteen (14) days of Notice to Proceed, the Electrical Contractor's Low Voltage Installer/Vendor shall furnish the following in a single consolidated submittal:
 - a. All required permits and provide copies to the Owner's Project Manager, Architect, and Engineer.
 - b. Complete manufacturer's product literature for all cable, patch panels, cross- connect blocks, cable supports, cable labels, outlet devices, and other products to be used in the installation. In addition, whenever substitutions for recommended products are made,

samples (when requested by the Owner's Project Manager, Architect, or Engineer) and the manufacturer's supporting documentation demonstrating compatibility with other related products shall be included. The submittal shall have some type of distinguishing marker or pointer to indicate what specific product is to be provided.

- c. A time-scaled Construction Schedule, using PERT/CPM, indicating general project deadlines and specific dates relating to the installation of the cable distribution system.
- d. Low Voltage Vendor's Category 6A UTP cable test result forms, and a list of instrumentation to be used for systems testing.
- e. A letter shall be provided stating, by section and subsection, that the SCS installer complies with the entire Specifications section. If the installer intends to deviate from any portion of the Specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the Specifications compliance letter. No deviations shall be acceptable until they have been accepted by the Owner's Project Manager and the Engineer.
- f. The Electrical Contractor's Low Voltage Vendor shall submit all of the following certifications and the certifications must contain dates which are valid from the date of proposal and not expire any sooner than 12 months after substantial completion of the project.

B. Shop Drawings

- 1. Submit the following items to the Architect for review and approval, within twenty-eight (28) days of notice to proceed:
 - a. Proposed circuit routing and circuit grouping plan prepared by a BICSI certified RCDD (Registered Communications Distribution Designer). The RCDD certification must be current. Identifiable, separate routing shall be shown for the station cabling.
 - b. In addition to the cable routing, the submitted drawings shall indicate the following, even if the following is expected to be provided by the Electrical Contractor's Low Voltage Vendor.
 - 1.) Location of wall penetrations (all penetrations shall be sleeved and contain protective cable bushings at both ends)
 - 2.) Location of sleeved wall pass-thru
 - 3.) Size of sleeve at each location installed
 - 4.) Quantity of cable passing through each sleeve.
 - 5.) Location of drops in each room (quantity or labeling of drops are not required in the submittal plans. Labeling shall be provided in the closeout plans and quantities shall be as per the contract documents, addendums, and issued changes. Each drop shall be labeled for the type of outlet to be installed.)

6.) Conduit routing, size, quantity, and stub-up locations for all floor mounted outlets.

- c. A letter shall be provided stating that the Electrical Contractor's SCS Vendor has complied with all project drawings, including all general notes and specifications. If the Vendor/Installer intends to deviate from any portion of the Specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the Specifications compliance letter. No deviations shall be acceptable until they have been accepted by the Engineer.

C. Close-out Procedures:

1. Two (2) copies of the following documents shall be delivered to the Architect and the Owner's Representative at the time of system acceptance. The close out submittals shall include:
 - a. Inspection and Test Reports: During the course of the Project, the Electrical Contractor's Low Voltage Vendor shall maintain an adequate inspection system to ensure that the materials supplied and the work performed, conform to contract requirements. The Low Voltage Vendor shall provide written documentation that indicates that materials acceptance testing was conducted as specified. The Low Voltage Vendor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
 - b. Provide complete test reports for all cabling and devices that comprise system as outlined in this document.
 - c. Include the name, address and telephone of the authorized factory representative with a 24 hour emergency service number.
 - d. The submittal shall also include Manufacturer's data sheets and installation manuals/instructions for all equipment installed, a list of recommended spare parts.
 - e. Generic or typical Owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
 - f. An up-to-date record ("as-built") set of approved shop drawing prints that have been revised to show each and every change made to the signal cabling system from the original approved shop drawings. Drawings shall consist of a scaled plan of each building showing the placement of each individual item of the technical cabling system equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
 - g. As-Built Drawings shall include cable pathways, camera locations with correct labeling and MDF/IDF locations. The As-Built drawings shall be prepared using AutoCad 2002 or later. Provide electronic versions of the As-Built on CD media.
 - h. All drawings must reflect point-to-point wiring, device address and programmed characteristics as verified in the presence of the Engineer and/or the Owner's Project Manager unless device addressing is electronically generated, and automatically

graphically self-documented by the system.

- i. A copy of the manufacturer's warranty on the installed system.
- j. Any keys to cabinets and/or equipment and special maintenance tools required to repair, maintain, or service the system.
- k. Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be provided to the Owner's Project Manager for transmittal to the Owner, for their use, in a three-ring binder labeled with the project name and description. (4 copies).
- l. Upon completion of the work and at a time designated by the Architect, provide formal training sessions for the Dillard's operating personnel to include location, operation, and maintenance of all included systems and equipment. Minimum amount of training time shall be at least 4 hours.
- m. One (1) 30" x 42" laminated floor plan sheet per building floor illustrating technology drops and cable designation. The Electrical Contractor's Low Voltage Vendor shall provide one complete floor plan sheet for each telecommunications room (MDF or IDF)

PART 2 - PRODUCTS

2.1 COMMUNICATIONS EQUIPMENT/WIRING ROOMS

- A. The room shall be provided with the proper architectural, HVAC, humidity, lighting, grounding, and power environment for communications equipment.
- B. An isolated grounding electrode and a bonded grounding electrode shall be provided in the room. The isolated ground electrode shall consist of a ground bar installed at the base of the backboard and bonded to the main power service entry ground bus. Grounding bars shall be a Hoffman # DGTB412 or Harger HDGBI Series.

2.2 CABLE PATHWAYS

- A. Cables shall be placed in accessible void spaces above ceiling and/or under floors unless conduit or other types of raceway systems are required.
- B. Cable drops from ceilings to workstation communications outlets shall be placed in conduit inside wall and column cavities as possible. Surface mounted raceway on the outside of solid walls and columns, may only be used as a last resort and require pre- approval from the Engineer. Communications/power drop-poles (tele/power poles), floor- duct, and under-carpet systems are not acceptable.
- C. Conduit
 - 1. EMT shall be used indoors unless code requirements mandate other types of raceway systems for unusual applications.
 - 2. RMC shall be used outdoors above ground and in transitions from underground to

aboveground.

3. PVC Schedule 40, minimum, shall be used underground directly buried in accordance with the NEC requirements as applicable. The minimum depth of earth cover shall be twenty-four (24) inches. Warning tape and tracer wire shall be employed.
4. Conduit drops installed inside walls from ceiling space to workstation wall outlets shall be 1" in diameter, minimum. These conduits shall stub-up a minimum of six (6) inches into accessible ceiling space. The other end should terminate in outlet boxes consisting of 4"x4" (nominal, 2-gang) metal boxes with single-gang plaster ring recessed in the walls as required. Unless otherwise required for unique situations, the boxes shall be mounted at heights as shown on the drawings.
5. Pull strings shall be provided in all empty conduit runs. End caps shall be provided on all empty conduit terminations.
6. Bushings and identification labels shall be provided on all conduit pad/slab stub-ups and ends.
7. Where conduit runs penetrate fire or smoke rated barriers, they shall be sealed with a fire stopping compound complying with National Fire Protection Association and state Fire Marshal requirements.
8. All telephone system signal wiring run in building's joist spaces shall be run in EMT conduit. Alternately, these cables can be run "open" in building's joist space if permitted by local electrical codes and all low voltage requirements set forth in this specification section are met.
9. Where plenum rated low voltage, Class 2 signal cable is permitted and utilized, EMT conduits shall rise from wall and floor outlets and be stubbed out into plenum joist space and be fitted with cable protecting insulated bushings.
10. It is the Owner's intention to utilize plenum rated signal cables in return air plenums when at all possible and dispense with conduit except as specifically noted.

D. Branch Circuit 120 Volt Power

1. Branch 120 volt circuitry for all node equipment shall include a green equipment grounding conductor and a green with yellow tracer isolated grounding conductor. Refer to the contract drawings and Section 26 05 26 – "Grounding and Bonding" in these specifications for additional information. Electrical Contractor shall provide and install all conduit and fittings and all 120 volt wiring and power sources.

2.3 CABLE/WIRE/HARDWARE

A. Communications Outlets

1. The quantity and combination of devices on any given modular faceplate shall be configured as shown on the drawings. This information, as well as location of the outlets, shall be

obtained from the specific requirements of the Owner by the designer and shown on the drawings.

- a. Each workstation wall outlet shall be as shown on the drawings.
- b. The outlets shall be equipped with any combination of four (4) different wiring devices, or three (3) with one (1) blank port, as required, eight (8)-pin, modular, Category 6A RJ45 jacks. Refer to drawing details for additional information.
- c. Communications outlet labeling shall be provided. All telecommunications outlet faceplates shall be numbered as per the Owner's already established naming convention.

B. Cable/Wire

1. All computer/data/voice and riser cables shall be installed completely (placement and terminations) by qualified, experienced installers of such wiring.
2. The computer/data/voice station cabling shall consist of four (4)-pair, 23 AWG, UTP (Unshielded Twisted Pair) cables per outlet rated CMP/MPP (Communication Plenum/Multipurpose Plenum) by the NEC as required by the application and quality as shown on the drawings. This cable shall have a rating of Category 6A for transmission characteristics as specified by the ANSI/TIA/EIA-568 standard "for individual components". Additionally, these cables shall have "publicly advertised" performance characteristics recorded at 250 MHz and 328-feet, minimum:
 - Insertion Loss ≤ 32.2 dB
 - Near End Crosstalk ≥ 42.3 dB
 - Power Sum NEXT ≥ 40.3 dB
 - Equal Level Far End Crosstalk ≥ 26.8 dB
 - Power Sum ELFEXT ≥ 23.8 dB
 - Attenuation to Crosstalk Ratio ≥ 10.3 dB
 - Power Sum ACR ≥ 8.1 dB
 - Return Loss (min) ≥ 17.3 Db
3. Station cables shall be of the same manufacturer name and design/model construction for the entire project. No mix-matching of brands for voice and/or data shall be allowed. Computer/data/voice station cables shall be as specified on the drawings.
4. All station cables that are routed beneath the slab or below grad are to be indoor/outdoor (I/O) rated, No Exceptions.

C. Connection Hardware

1. All Category 6A termination panels, connectors, and hardware shall be mounted and terminated by factory certified installer of such components.
2. Data UTP patch panels mounted on relay racks shall be provided in the communications equipment/wiring rooms and connected and arranged in color coded fields as required by the drawings. Ports on all blocks and panels shall be terminated in sequential alphanumeric order with each port individually labeled for uniform location identification across each color coded

field. The panels shall be 24-port / 1- rack space style, provided in quantities (as required) and be equipped with the necessary integral quantity (as required plus 30% spares) of eight (8)-pin, modular,

Category 6A compliant RJ45 ports with 110 type wire connectivity. All Category 6A rated components shall have EIA/TIA 568-B pin-out.

3. All Category 6A Voice and Data UTP shall be terminated on Category 6A rated patch panels as required. Patch panels shall be mounted to distribution racks as required. Each UTP cable and associated patch panel port (front and rear) shall be labeled for uniform location identification. Refer to the drawings for additional installation information.
4. Wireless access points are existing to remain intact and in-service..

D. Testing

1. Testing shall be performed in the presence of a representative as designated by the Engineer and/or Owner's Project Manager. Sufficient advanced notice of test dates shall be provided to coordinate testing.
2. All voice (station, riser & outside plant) cables and associated connection hardware shall be tested and documented by the Electrical Contractor's Low Voltage Vendor. The test procedure shall demonstrate as a minimum:
 - a. Continuity (more than 2,600 ohms is considered open)
 - b. Shorts (60,000 ohms or less is considered a short)
 - c. Proper polarity (top and ring correct)
 - d. Proper termination (splits & wrong terminations)
 - e. Grounded conductors (60,000 ohms or less to ground is considered a fault)
 - f. Detection of AC or DC power on any conductor (power fault test)
 - g. User's equipment must function normally when connected to the installed wiring.
3. All UTP data station cables and associated connection hardware shall be tested to certify the performance category of the link as installed. All Category rated station cables shall be tested in accordance with procedures laid out in ANSI/TIA/EIA-568 for the "Permanent Link". Any cable that fails testing shall be reported along with the procedures used to rectify the failure (ie, Replaced cable, reterminated the jack, etc.). Jobsite Special Systems Contractor tests shall utilize an ANSI/TIA/EIA-568-B Level III compliant cable tester (Fluke DTX or equal). Electronic results for each UTP Category rated four pair cable in Portable Document Format (PDF) shall be submitted on compact disk (CD-Rom) as a part of the Low Voltage Vendor's as built project performance acceptance records. In addition to the above information the documentation shall include a pass/fail indication for the specified cable, the test date, the serial number and software version of the scanner used, and a copy of the calibration certificate of the scanner. File formats requiring proprietary software applications for reading the results shall not be acceptable. If the vendor requires additional information concerning the testing requirements, refer to the TIA/EIA ANSI/TIA/EIA-568 Telecommunications Building Wiring Standard. Category 6A rated testing shall be executed by factory trained technicians with ample field experience. Technician certification shall be submitted to the Designer with the test documentation.

2.4 GENERAL

- A. Applicable Documents – The following current ratified publications of standards and codes shall apply to all telecommunications related work:
1. ANSI/TIA/EIA Standard for Commercial Building (568, 569, 570, 606, 607, TSB's)
 2. BOC's and AT&T Plant Standards
 3. BICSI: Telecommunications Distribution Methods Manual (TDMM); Outside Plant Design Reference Manual (OSPDRM); Information Transport Systems Installation Reference Manual (ITSIMM)
 4. FCC Part 68
 5. National Electric Code (NEC/NFPA-70)
 6. Other State Adopted Codes
 7. Underwriters Laboratories
 8. IEEE P1100 (Emerald Book)

In the event of ambiguities among the above documents, the more stringent shall prevail.

B. Maintenance Considerations

1. All wiring shall be installed to maximize the safety, maintainability, and performance effectiveness of maintenance personnel and manpower. Terminations and splices shall be placed and supported with convenient accessibility so as to maximize the ease and efficiency with which it can be maintained. All cables in equipment/wiring rooms shall be provided with twenty-five (25) feet long maintenance loops to facilitate future modifications.

PART 3 - EXECUTION

3.1 GENERAL

A. Fire Wall Penetrations if fire walls are present

1. The Electrical Contractor's Low Voltage Vendor shall avoid penetration of fire-rated walls and floors wherever possible. Where penetrations are necessary, they shall be sleeved with metallic conduit and resealed with an Underwriter Laboratories (UL) approved sealant. Low Voltage Vendor shall also seal all floor, ceiling and wall penetrations in fire or smoke barriers and in the wiring closet.

B. Allowable Cable Bend Radius And Pull Tension

1. In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation. Refer to the cable manufacturers allowable bend radius and pull tension data for the maximum allowable limits.

C. Cable Lubricants

1. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue.

D. Pull Strings

1. Provide pull strings in all new conduits, including all conduits with cable installed as part of this CONTRACT. Pull test is not to exceed 200 pounds. Data and video cables can be pulled together with pull strings.

E. Conduit Fill

1. Conduit fill shall not exceed 40% or as follows:

<u>Conduit Size</u>	<u>No. of Cat. 6 Cables</u>
½"	2
¾"	4
1"	8
1 ¼"	11
1 ½"	16
2"	26

F. Damage

1. The Electrical Contractor's Low Voltage Vendor shall replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over-tightened bindings, loosely twisted and over-twisted pairs at terminals and cable sheath removed too far (over 1-1/2 inches).
2. The Low Voltage Vendor shall replace any damaged ceiling tiles that are broken or discolored during cable installation.

G. Clean Up

1. All clean up activity related to work performed will be the responsibility of the Low Voltage Vendor and must be completed daily before leaving the facility.

3.2 DOCUMENTATION

A. Floor Plan

1. A floor plan clearly labeled with all outlet jack numbers shall be included in the as- built plans.

- B. All cables shall be labeled at both ends. This includes but not limited to horizontal voice and data cabling and copper backbone tie cables.

3.3 SIGNAL CABLE INSTALLATION AT EXISTING RACK (Existing Rack is to remain in service)

A. Cable Placement

1. Cable installation in the Wiring Closet must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance location. Avoid crossing area horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining a working distance from these openings.

B. Cable Routing

1. Cable shall be routed as close as possible to the ceiling, floor or corners to ensure that adequate wall or backboard space is available for current and future equipment. All cable runs within the Wiring Closet shall be horizontal or vertical within the constraints of minimum cable bending radii. Minimum bend radius shall be observed. Cables shall not be tie-wrapped to electrical conduit or other equipment.

C. Installation

1. All incoming cables shall be routed on the cable tray and neatly dressed down to the patch panels.

D. Hardware

- E. Provide rack and jack panel hardware as required for all new data station wiring.

3.4 STATION WIRING INSTALLATION

A. General

1. Cabling between wiring closet and workstation locations shall be made as individual home runs. No intermediate punch down blocks or splices may be installed or utilized between the wiring closet and the communications outlet at the workstation location. No exceptions.
2. All cable must be handled with care during installation so as not to change performance specifications. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable. There shall never be more than one and one-half inches of unsheathed Category 6A UTP cable at either the wiring closet or the workstation termination locations.
3. Category 6A signal cables will be installed on this project. These cables must be installed in a prescribed manner in order to allow proper operation (high speed baud rate data transfer) of the electronic equipment the cables interconnect. Installation of Category 6A signal cables shall be accomplished as follows:
 - a. Cat.6A cables shall not lay directly on top of light fixtures. Regardless of ballast type (magnetic or electronic) Cat.6A signal cables should be routed at least eighteen (18") inches away from fluorescent fixtures, power conductors, and other power consuming loads.
 - b. Cat.6A signal cables are commonly supported at distant intervals causing physical stress due to tensile loading. When this occurs, cable geometry is altered resulting in reduced

data transmission speed. The maximum tensile loading should not exceed 25 lbs., beyond this point performance is threatened. Correcting cable tension to lighten the load after it has been stressed may not reverse the effect of over-loading.

- c. Pulling Cat.6A signal cables through conduit with too small of a bend radius. Cables should be "swept" to prevent bends. The bend radius will not be less than eight times the outside diameter of the cable. For Category 6A cables, this means the cable may not be bent beyond 1.25 inch. Kinking the cable jacket changes the shape of the cable core, moves the pairs, and distorts the symmetry. Again this sort of damage can be permanent despite efforts to work them out.
- d. Over-cinching can cause compression of the cable jacket, deforming the cable, and causing the same effects as over-bending and kinking the cable. Cable ties or cords must never be tightened to the point that strain is placed on the jacket.
- e. Routing too many cables in a bundle. Cables on the inside of the bundle can be damaged as well as cables on the outside. Bundles must be examined to assure the weight of the bundle is not causing additional compression on the cables' jackets. This is also a concern for cables installed within a tray or duct, as they can easily be crushed.

B. Exposed Cable

- 1. All cabling shall be installed inside walls or ceiling spaces whenever possible. Exposed cables and/or cables routing through mechanical rooms, electrical rooms, or restrooms shall be installed inside conduits, unless noted otherwise on the project drawings.
- 2. Additional exposed cable runs will require the Owner's Project Manager and Engineer approval, and will only be allowed when no other options exist.
- 3. All cable routing through conduits and sleeves shall maintain a 40% maximum conduit fill ratio.

C. Placement

- 1. All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair the Owner's efficient use of their full capacity.

D. Cable Routes

- 1. All new signal cabling installed in exposed construction areas **must** be routed in EMT Conduit.
- 2. New signal cabling routed above accessible lay-in ceilings can be routed "open" and supported with bridal ring cable supports. Cable support bridal rings shall be permanently anchored to building structure or substrate and have a "saddle" installed to prevent wire pinching. Provide attachment hardware and anchors designed for the structure to which attached and that are suitably sized to carry the weight of the cables to be supported. Do not route cable through webbing of structural steel. Cabling must be supported in dedicated supports intended to support cabling as described in this

section. Electrical Contractor's Low Voltage Vendor shall adhere to the manufacturer's suggested fill ratio for each size cable support installed.

3. Attaching cable to pipes or other mechanical items is not permitted. Communications cable shall be rerouted so as to provide a minimum of 18 inches spacing from light fixtures, sources of heat, power feeder conduits and EMI sources. Cabling shall not be attached to ceiling. Runs shall be routed down the corridors; parallel or perpendicular to building structure. Multiple cables to be bundled together at and between each cable support installed.
4. Low Voltage Vendor shall be responsible for coordinating with other trades on the project so that the installed cable pathway does not interfere with the installation of other systems to insure that mechanical ducts, pipes, conduits or any other above ceiling systems are not putting unnecessary stress on any portion of the install SOS.
5. All cabling can be routed diagonally ("as the crow flies") above the finished accessible ceiling in order to reduce cable length.

E. RJ-45 Jack Pin Assignments

1. Pin connections at data jack panels shall match pin connections at outlets (straight through wiring).

F. Low Voltage Vendor shall install faceplate icons.

END OF SECTION 27 10 00

DIVISION 28 SECTION 28 31 01 – EXISTING FIRE ALARM SYSTEM ALTERATION AND ADDITIONS

PART 1 - GENERAL

1.1 FIRE ALARM SYSTEM ALTERATIONS AND ADDITIONS

- A. This section covers alterations and additions to an existing, installed Fire Alarm System. The new alterations and additions work which will occur in the remodeled basement area of the T.L. James Building will include, but not be limited to, new alarm initiating devices, alarm notification appliances, auxiliary control devices, signal power expanders, power supplies, and signaling and power wiring as shown on the drawings and as specified herein.
- B. The Fire Alarm System shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all signal conductors.
- C. The Fire Alarm System shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001 – 1994.
- D. The new required peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof) and must be compatible with existing FACP.
- E. The Fire Alarm System and all its existing and new components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.
- F. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

END OF SECTION 28 31 01