VAIL MECHANIC SHOP EXPANSION

VAIL UNIFIED SCHOOL DISTRICT

Specifications

13192 E Mary Ann Cleveland Way
VAIL, AZ 85641

SWAIM PROJECT #1116.58
DATE: February 1, 2021
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Invitation for Bid

INVITATION FOR BID#: 21-013-23
MATERIAL OR SERVICE: Vail Mechanic Shop Expansion
DUE DATE AND TIME: March 08, 2021 at 2:00 p.m., Arizona Time

OPENING LOCATION:
Calvin Baker Leadership Center
Attention: Tori Gamble, Purchasing Department
13801 E. Benson Highway, Suite B
Vail, Arizona 85641

NON-MANDATORY PRE-BID CONFERENCE
DATE AND TIME: February 22, 2020
at 2:00 p.m., Arizona Time

PRE-BID CONFERENCE LOCATION
13192 E. Mary Ann Cleveland Way, Vail, AZ 85641

SUBSTITUTION REQUESTS, DUE BY EMAIL
No later than March 04, 2021 at 10:00 a.m., Arizona Time

QUESTIONS, DUE BY EMAIL
No later than March 04, 2021 at 10:00 a.m., Arizona Time

In accordance with School District Procurement Rules in the Arizona Administrative Code (A.A.C.) promulgated by the State Board of Education pursuant to A.R.S. 15-213, bids for the material or services specified will be received by the Vail Unified School District No. 20, at the above specified location, until the time and date cited. Bids received by the correct time and date shall be opened and the Offeror’s submitting shall be publicly read. All other information contained in the bid shall remain confidential until award is made. If you need directions to our office, please call (520) 879-2000. The Invitation for Bid and all Amendment(s) will be posted to www.azpurchasing.org. It is the Offeror’s responsibility to check for and acknowledge Amendments.

Three (3) sets of the bid package are requested: one marked "Original", one marked "Copy", and one electronic copy on a USB. Bids shall be in the actual possession of the District, at the location indicated, on or prior to the exact time and date indicated above. Late bids shall not be considered. Bids must be submitted in a sealed envelope with the solicitation number and Offeror’s name and address clearly indicated on the package. All bids must be written legibly in ink or typewritten. Additional instructions for preparing a bid are provided herein.

VENDORS ARE STRONGLY ENCOURAGED TO CAREFULLY READ THE ENTIRE INVITATION FOR BID.

Tori Gamble, Procurement Analyst
Date 02/11/2021

Questions regarding this Invitation for Bid should be directed to:
Tori Gamble, Procurement Analyst
Email: gamblet@vailschooldistrict.org
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DOCUMENTS REFERENCED

You may access a copy of the documents referenced within this bid at the following web addresses:

Arizona Revised Statutes (A.R.S.) is available at: http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp.


UNIFORM INSTRUCTIONS TO OFFERORS

1. Definition of Terms
As used in these instructions, the terms listed below are defined as follows:

A. “Attachment” means any item the Solicitation requires an Offeror to submit as part of the Offer.

B. “Contract” means the combination of the Solicitation, including the uniform and Special Instructions to Offerors, the Uniform and Special Terms and Conditions, and the Specifications and Statement or Scope of Work; the Offer and any Best and Final Offers; and any Solicitation Amendments (Addenda) or Contract Amendments; and any terms applied by law.

C. “Contract Amendment” means a written document signed by the Procurement Officer that is issued for the purpose of making changes in the Contract.

D. “Contractor” means any person who has a contract with the School District.

E. “Days” means calendar days unless otherwise specified.

F. “Exhibit” means any item labeled as an Exhibit in the Solicitation or placed in the Exhibits section of the solicitation.

G. “Gratuity” means a payment, loan, subscription, advance, deposit of money, services, or anything of more than nominal value present or promised, unless consideration of substantially equal or greater value is received.

H. “Offer” means bid, proposal or quotation.

I. “Offeror” means a vendor who responds to a Solicitation.

J. “Procurement Officer” means the person duly authorized to enter into and administer Contracts and make written determinations with respect to the Contract or his or her designee.

K. “Responsible Offeror” means the Offeror who has the capability to perform the contract requirements and the integrity and reliability to assure complete and good faith performance and who submits the lowest bid.

L. “Responsive Offeror” means the Offeror who submits a bid that conforms in all material respects to this Invitation for Bid, Instruction to Offeror and the Plans and Specifications which are incorporated herein by this reference.

M. “Solicitation” means an Invitation for Bids (IFB), a Request for Proposals (RFP), or a Request for Quotations (RFQ).

N. “Solicitation Amendment (or Addendum)” means a written document that is authorized by the Procurement Officer and issued for the purpose of making changes to the Solicitation.

O. “Subcontract” means any Contract, express or implied, between the Contractor and another party or between a subcontractor and another party delegating or assigning, in whole or in part, the making or furnishings of any material or any service required for the performance of the Contract.

P. “School District” means the School District that executes the contract.

2. Inquiries

A. Duty to Examine. It is the responsibility of each Offeror to examine the entire Solicitation, seek clarification in writing, and check its Offer for accuracy before submitting the Offer. Lack of care in preparing an Offer shall not be grounds for withdrawing the Offer after the Offer due date and time nor shall it give rise to any Contract claim.
B. Solicitation Contact Person. Any inquiry related to a Solicitation, including any requests for or inquiries regarding standards referenced in the Solicitation shall be directed solely to the Solicitation contact person. The Offeror shall not contact or direct inquiries concerning this Solicitation to any other employee unless the Solicitation specifically identifies a person other than the Solicitation contact person as a contact.

C. Submission of Inquiries. The Procurement Officer or the person identified in the Solicitation as the contact for inquiries may require that an inquiry be submitted in writing. Any inquiry related to a Solicitation shall refer to the appropriate Solicitation number, page, and paragraph. Do not place the Solicitation number on the outside of the envelope containing that inquiry since it may then be identified as an Offer and not be opened until after the Offer due date and time.

D. Timeliness. Any inquiry shall be submitted as soon as possible and at least seven (7) days before the Offer due date and time. Failure to do so may result in the inquiry not being answered.

E. No Right to Rely on Verbal Responses. Any inquiry that results in changes to the Solicitation shall be answered solely through a written Solicitation Amendment or Addendum. An Offeror may not rely on verbal responses to inquiries.

F. Solicitation Amendments/Addenda. The Solicitation shall only be modified by a Solicitation Amendment or Addendum.

G. Pre-Offer Conference. If a pre-offer conference has been scheduled under this Solicitation, the date, time, and location appear on the Solicitation cover sheet or elsewhere in the Solicitation. An Offeror should raise any questions it may have about the Solicitation or the procurement at that time. An Offeror may not rely on any verbal responses to questions at the conference. Material issues raised at the conference that result in changes to the Solicitation shall be answered solely through a written Solicitation Amendment or Addendum.

H. Persons with Disabilities. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting the appropriate Solicitation contact person. Requests shall be made as early as possible to allow time to arrange the accommodation.

3. Offer Preparation

A. Forms: No Facsimile or Electronic Offers. An Offer shall be submitted either on the forms provided in this Solicitation or their substantial equivalent. Any substitute document for the forms provided in this Solicitation will be legible and contain the same information requested on the form. A facsimile, electronic or mailgram offer shall be rejected.

B. Typed or Ink; Corrections. The Offer must be typed or in ink. Erasures, interlineations or other modifications in the Offer must be initialed in ink by the person signing the Offer. Modifications shall not be permitted after Offers have been opened except as otherwise provided under applicable law.

C. Evidence of Intent to be Bound. The Offer and Acceptance form within the Solicitation must be submitted with the Offer and must include a signature by a person authorized to sign the Offer. The signature shall signify the Offeror’s intent to be bound by the Offer and the terms of the Solicitation and that the information provided is true, accurate, and complete. Failure to submit verifiable evidence of intent to be bound, such as an original signature, may result in rejection of the Offer.

D. Exceptions to Terms and Conditions. All exceptions included with the Offer shall be submitted in a clearly identified separate section of the Offer in which the Offeror clearly identifies the specific paragraphs of the Solicitation where the exceptions occur. Any exceptions not included in such a section shall be without force and effect in any resulting Contract unless such exception is specifically referenced by the Procurement Officer in a written statement. The Offeror’s preprinted or standard terms will not be considered as a part of any resulting Contract.

E. Subcontracts. Offeror shall clearly list any proposed subcontractors and the subcontractor’s proposed responsibilities in the Offer.
F. **Cost of Offer Preparation.** The District will not reimburse any Offeror the cost of responding to a Solicitation.

G. **Solicitation Amendments/Addenda.** Unless otherwise stated in the Solicitation, each Solicitation Amendment or Addendum shall be signed with an original signature by the person signing the Offer, and shall be submitted no later than the Offer due date and time. Failure to return a signed copy of a material Solicitation Amendment or Addendum or to follow the instructions for acknowledgement of the Solicitation Amendment/Addendum may result in rejection of the Offer.

H. **Federal Excise Tax.** School Districts are exempt from Federal Excise Tax on manufactured goods. Exemption Certificates will be prepared upon request.

I. **Provision of Tax Identification Numbers.** Offerors are required to provide their Arizona Transaction Privilege Tax number and/or Federal Employer Identification number, if applicable, in the space provided on the Offer and Acceptance Form and provide the tax rate and amount, if applicable, on the Cost Form.

J. **Identification of Taxes in Offer.** School Districts are subject to all applicable state and local transaction privilege taxes. If Arizona resident Offerors do not indicate taxes on a separate item in the Offer, the School District will conclude that the price(s) offered includes all applicable taxes.

K. **Disclosure.** If the Firm, business, or person submitting this Offer has been debarred, suspended, or otherwise lawfully precluded from participating in any public procurement activity, including being disapproved as a subcontractor with any federal, state, or local government, or if any such preclusion from participation from any public procurement activity is currently pending, the Offeror must fully explain the circumstances relating to the preclusion or proposed preclusion in the Offer. The Offeror shall include a letter with its Offer setting forth the name and address of the governmental unit, the effective date of this suspension or debarment, the duration of the suspension or debarment, and the relevant circumstances relating the suspension or debarment. If suspension or debarment is currently pending, a detailed description of all relevant circumstances including the details enumerated above must be provided.

L. **Solicitation Order of Precedence.** In the event of a conflict in the provisions of this Solicitation, the following shall prevail in the order set forth below:

   1. Addenda/Amendments;
   2. Special Terms and Conditions;
   3. Uniform General Terms and Conditions;
   4. Statement of Scope of Work;
   5. Specifications;
   6. Attachments;
   7. Exhibits;
   8. Special Instructions to Offerors; and
   9. Uniform Instructions to Offerors

M. **Delivery.** Unless stated otherwise in the Solicitation, all prices shall be F.O.B. Destination and shall include all delivery and unloading at the destination(s).

4. **Submission of Offer**

A. **Sealed Envelope or Package.** Each Offer shall be submitted to the submittal location identified in this Solicitation, in a sealed envelope or package that identifies its contents as an Offer and the Solicitation number to which it responds. The appropriate Solicitation number shall be plainly marked on the outside of the envelope or package.

B. **Offer Amendment or Withdrawal.** An Offer may not be amended or withdrawn after the Offer due date and time except as otherwise provided under applicable law.
C. **Public Record.** Under applicable law, all Offers submitted and opened are public records and must be retained by the School District. Offers shall be open to public inspection after Contract award, except for such Offers deemed to be confidential by the School District. If an Offeror believes that information in its Offer should remain confidential, it shall stamp as confidential that information and submit a statement with its Offer detailing the reasons that information should not be disclosed. The School District shall make a determination on whether the stamped information is confidential pursuant to the School District’s Procurement Code.

D. **Non-collusion, Employment, and Services.** By signing the Offer and Acceptance form and notarization the non-collusion affidavit or other official contract form, the Offeror certifies that:

1. It did not engage in collusion or other anti-competitive practices in connection with the preparation or submission of its offer; and

2. It does not discriminate against any employee, applicant for employment, or person to whom it provides services because of race, color, religion, sex, national origin, or disability, and that it complies with all applicable federal, state, and local laws and executive orders regarding employment.

5. **Additional Bid Information**

A. **Unit Price Prevails.** Where applicable, in the case of discrepancy between the unit price or rate and the extension of that unit price or rate, the unit price or rate shall govern.

B. **Late Offers.** An offer submitted after the exact Offer due date and exact time shall be rejected.

C. **Disqualification.** The Offer of an Offeror who is currently debarred, suspended or otherwise lawfully prohibited from any public procurement activity may be rejected.

D. **Offer Acceptance Period.** An Offeror submitting an Offer under this Solicitation shall hold its Offer open for the number of days from the Offer due date that is stated in the Solicitation. If the Solicitation does not specifically state a number of days for the Offer acceptance, the number of days shall be ninety (90).

E. **Payment.** Payments shall comply with the requirements of A.R.S. Titles 35 and 41, Net 30 days. Upon receipt and acceptance of goods or services, the Contractor shall submit a complete and accurate invoice for payment within thirty (30) days.

F. **Waiver and Rejection Rights.** Notwithstanding any other provision of the solicitation, the School District reserves the right to:

   1. Waive any minor informality;
   2. Reject any and all offers or portions thereof; or
   3. Cancel a solicitation.

6. **Award**

A. **Number or Types of Awards.** Where applicable, the School District reserves the right to make multiple awards or to award a Contract by individual line items, by a group of line items, or to make an aggregate award, whichever is deemed most advantageous to the School District. If the Procurement Officer determines that an aggregate award to one Offeror is not in the School District’s interest, “all or none” Offers shall be rejected.

B. **Contract Inception.** An Offer does not constitute a Contract nor does it confer any rights on the Offeror to the award of a Contract. A Contract is not created until the Offer is accepted in writing by an authorized District Representative of the Offer and Acceptance Form. A letter or other notice of award or of the intent to award shall not constitute acceptance of the Offer.
C. **Effective Date.** The effective date of this Contract shall be the date that the authorized District Representative signs the Offer and Acceptance Form or other official contract form, unless another date is specifically stated in the Contract.

D. **Final acceptance.** The final acceptance will be contingent upon the approval of the Governing Board.

7. **Protests**

A protest shall comply with and be resolved according to Arizona Department of Education School District Procurement Code Rule A.A.C. R7-2-1141 through R7-2-1153. Protests shall be in writing and be filed with the District Representative, Calvin Baker, Superintendent. A protest of a Solicitation shall be received by the District Representative before the Offer due date. A protest of a proposed award or of an award shall be filed with the Procurement Officer within ten (10) days after the protester knows or should have known the basis of the protest. A protest shall include:

A. The name, addresses, and telephone number of the protester;
B. The signature of the protester or its representative;
C. Identification of the purchasing agency and the Solicitation or Contract number;
D. A detailed statement of the legal and factual grounds of the protest including copies of relevant documents; and
E. The form of relief requested.
UNIFORM GENERAL TERMS AND CONDITIONS

1. Contract Interpretation

A. Arizona Law. The law of Arizona applies to this Contract including, where applicable, the Uniform Commercial Code as adopted by the State of Arizona and the Arizona School District Procurement Code, Arizona Revised Statutes (A.R.S.) 15-213, and its implementing rules, Arizona Administrative Code (A.A.C.) Title 7, Chapter 2, Articles 10 and 11.

B. Implied Contract Terms. Each Provision of law and any terms required by law to be in this Contract are a part of this Contract as if fully stated in it.

C. Relationship of Parties. The Contractor under this Contract is an independent Contractor. Neither party to this Contract shall be deemed to be the employee agent of the other party to the Contract.

D. Severability. The provisions of this Contract are severable. Any term or condition deemed illegal or invalid shall not affect any other term or condition of the Contract.

E. No Parol Evidence. This Contract is intended by the parties as a final and complete expression of their agreement. No course of prior dealings between the parties and no usage of the trade shall supplement or explain any terms used in this document.

F. No Waiver. Either party’s failure to insist on strict performance of any term or condition of the Contract shall not be deemed waiver of that term or condition even if the party accepting or acquiescing in the nonconforming performance knows of the nature of the performance and fails to object to it.

2. Contract Administration and Operation

A. Records. Under A.R.S. § 35-214 and § 35-215, the Contractor shall retain and shall Contractually require each Subcontractor to retain all data and other records (“records”) relating to the acquisition and performance of the Contract for a period of five years. After the completion of the Contract. All records shall be subject to inspection and audit at reasonable times. Upon request, the Contractor shall produce a legible copy of any or all such records.

B. Non-Discrimination. The Contractor shall comply with State Executive Order No. 99-4, 2000-4 and all other applicable Federal and State laws, rules and regulations, including the Americans with Disabilities Act.

C. Audit. At any time during the term of this Contract and five (5) years. Thereafter, the Contractor’s or any Subcontractor’s books and records shall be subject to audit by the School District and, where applicable, the Federal Government, the extent that the books and records relate to the performance of the Contract or Subcontract.

D. Inspection and Testing. The Contractor agrees to permit access to its facilities, Subcontractor facilities and the Contractor’s processes for producing the materials, at reasonable time for inspection of the materials and services covered under this Contract. The School District shall also have the right to test at its own cost the materials to be supplied under this Contract. Neither inspection at the Contractor’s facilities nor testing shall constitute final acceptance of the materials. If the School District determines non-compliance of the materials, the Contractor shall be responsible for the payment of all costs incurred by the School District for testing and inspection.

E. Notices. Notices to the Contractor required by this Contract shall be made by the School District to the person indicated on the Offer and Acceptance form submitted by the Contractor unless otherwise stated in the Contract. Notices to the School District required by the Contract shall be made by the Contractor to the Solicitation Contact Person indicated on the Solicitation cover sheet, unless otherwise stated in the Contract. An authorized Procurement Officer and an authorized Contractor representative may change their respective person to whom notices shall be given by written notice and an Amendment to the Contract shall not be necessary.
F. Advertising and Promotion of Contract. The Contractor shall not advertise or publish information for commercial benefit concerning this Contract without the prior written approval of the Procurement Officer.

G. Property of the School District. Any materials, including reports, computer programs and other deliverables, created under this Contract are the sole property of the School District. The Contractor is not entitled to a patent or copyright on those materials and may not transfer the patent or copyright to anyone else. The Contractor shall not use or release these materials without the prior written consent of the School District.

3. Costs and Payments

A. Payments. Payments shall comply with the requirements of A.R.S. Titles 35 and 41, Net 30 days. Upon receipt and acceptance of goods or services, the Contractor shall submit a complete and accurate invoice for payment from the School District within thirty (30) days. The Purchase Order number must be referenced on the invoice.

B. Applicable Taxes.

1. Payment of Taxes by the School District. The School District will pay only the rate and/or amount of taxes identified in the Offer and in any resulting Contract/Purchase Order.

2. State and Local Transaction Privilege Taxes. The School District is subject to all applicable state and local transaction privilege taxes. Transaction privilege taxes apply to the sale and are the responsibility of the seller to remit. Failure to collect taxes from the buyer does not relieve the seller from its obligation to remit taxes.

3. Tax Indemnification. Contractor and all Subcontractors shall pay all federal, state, and local taxes applicable to its operation and any persons employed by the Contractor. Contractor shall, and require all Subcontractors to hold the School District harmless from any responsibility for taxes, damages and interest, if applicable, contributions required under federal, and/or state and local laws and regulations and any other costs including transaction privilege taxes, unemployment compensation insurance, Social Security and Worker’s Compensation.

4. IRS W-9. In order to receive payment under any resulting Contract, Contractor shall have a current I.R.S. W-9 Form on file with the School District.

C. Availability of Funds for the Next Fiscal Year. Funds may not presently be available for performance under this Contract beyond the current fiscal year. No legal liability on the part of the School District for any payment may arise under this Contract beyond the current fiscal year until funds are made available for performance of the Contract. The School District will make reasonable efforts to secure such funds.

4. Contract Changes

A. Amendments. This Contract is issued under the authority of the Procurement Officer who signed this Contract. The Contract may be modified only through a Contract Amendment within the scope of the Contract signed by the Procurement Officer. Changes to the Contract, including the addition of work or materials, the revision of payment terms, or the substitution of work or materials, directed by an unauthorized employee or made unilaterally by the Contractor are violations or the Contract and or applicable law. Such changes, including unauthorized written Contract Amendments, shall be void and without effect, and the Contractor shall not be entitled to any claim and this Contract based on those changes.

B. Subcontracts. The Contractor shall not enter into any Subcontract under this Contract without the advance written approval of the Procurement Officer. The Subcontract shall incorporate by reference the terms and conditions of this Contract.

C. Assignment and Delegation. The Contractor shall not assign any right nor delegate any duty under this Contract without the prior written approval of the Authorized District Representative.
5. Risk and Liability

A. Risk of Loss. The Contractor shall bear all loss of conforming material covered under this Contract until received by authorized personnel at the location designated in the purchase order or Contract. Mere receipt does not constitute final acceptance. The risk of loss for nonconforming materials shall remain with the Contractor regardless of receipt.

B. General Indemnification. Any contract entered by the District shall include the following indemnification language.

"Contractor shall indemnify, defend, save and hold harmless Vail Unified School District No. 20 and its officers, officials, agents, and employees (hereinafter referred to as "Indemnitee") from and against any and all claims, actions, liabilities, damages, losses, or expenses (including court costs, attorneys' fees, and costs of claim processing, investigation and litigation) (hereinafter referred to as "Claims") for bodily injury or personal injury (including death), or loss or damage to tangible or intangible property caused, or alleged to be caused, in whole or in part, by the negligent or willful acts or omissions of Contractor or any of its Districts, officers, directors, agents, employees or subcontractors. This indemnity includes any claim or amount arising out of or recovered under the Workers' Compensation Law or arising out of the failure of such Contractor to conform to any federal, state or local law, statute, ordinance, rule, regulation or court decree. It is the specific intention of the parties that the Indemnitee shall, in all instances, except for Claims arising solely from the negligent or willful acts or omissions of the Indemnitee, be indemnified by Contractor from and against any and all claims. It is agreed that Contractor will be responsible for primary loss investigation, defense and judgment costs where this indemnification is applicable. In consideration of the award of this contract, the Contractor agrees to waive all rights of subrogation against the District, its officers, officials, agents and employees for losses arising from the work performed by the Contractor for the District."

C. Indemnification - Patent and Copyright. To the extent permitted by law, the Contractor shall defend, indemnify and hold harmless the School District against any liability, including costs and expenses, for infringement of any patent, trademark, or copyright arising out of Contract performance or use by the School District of materials furnished or work performed under this Contract. The School District shall reasonably notify the Contractor of any claim for which it may be liable under this paragraph.

D. Force Majeure.

1. Except for payment of sums due, neither party shall be liable to the other nor deemed in default under this Contract if and to the extent that such party's performance of this Contract is prevented by reason of force majeure. The term "force majeure" means an occurrence that is beyond the control of the party affected and occurs without its fault or negligence. Without limiting the foregoing, force majeure includes acts of God; acts of the public enemy; war; riots; strikes; mobilization; labor disputes; civil disorders; fire; flood; lockouts; injections-intervention acts; or failures or refusals to act by government authority; and other similar occurrences beyond the control of the party declaring force majeure which such party is unable to prevent by exercising reasonable diligence.

2. Force Majeure shall not include the following occurrences:

   a) Late delivery of equipment or materials caused by congestion at a manufacturer's plant or elsewhere, or an oversold condition of the market; or
   b) Late performance by a Subcontractor unless the delay arises out of a force majeure occurrence in accordance with this force majeure term and condition; or
   c) Inability of either the Contractor or any Subcontractor to acquire or maintain any required insurance, bonds, licenses, or permits.

3. If either party is delayed at any time in the progress of the work by force majeure, the delayed party shall notify the other party in writing of such delay, as soon as is practicable and no later than the following working day, of the commencement thereof and shall specify the causes of such delay in such notice. Such notice shall be delivered or mailed certified-return receipt requested, and shall make a specific reference to this article, thereby invoking its provisions. The delayed party shall cause such delay to cease as soon as practicable and shall notify the other party in
writing when it has done so. The time of completion shall be extended by Contract Amendment for a period of time equal to the time that results or effects of such delay prevent the delayed party from performing in accordance with this Contract.

4. Any delay or failure in performance by either party hereto shall not constitute default hereunder or give rise to any claim for damages or loss of anticipated profits if, and to the extent that such delay or failure is caused by force majeure.

E. Third Party Antitrust Violations. The Contractor assigns to the School District any claim for overcharges resulting from antitrust violation the extent that those violations concern materials of services supplied by third parties to the Contractor toward fulfillment of this Contract.

6. Warranties

A. Liens. The Contractor warrants that the materials supplied under this Contract are free of liens.

B. Quality. Unless otherwise modified elsewhere in these terms and conditions, the Contractor warrants that for one year after acceptance by the School District of the materials or services, they shall be:

1. of a quality to pass without objection in the trade under the Contract description;

2. fit for the intended purposes for which the materials or services are used;

3. within the variations permitted by the Contract and are of even kind, quality, and quality within each unit and among all units;

4. adequately contained, packaged and marked as the Contract may require; and

5. conform to the written promises or affirmations of fact made by the Contractor.

C. Fitness. The Contractor warrants that any material or service supplied to the School District shall fully conform to all requirements of the Solicitation and all representations of the Contractor, and shall be fit for all purposes and uses required by the Contract.

D. Inspection/Testing. The warranties set forth in subparagraphs A through C of this paragraph are not affected by inspection testing of or payment for the materials or services by the School District.

E. Exclusions. Except as otherwise set forth in this Contract, there are no express or implied warranties or merchant ability fitness.

F. Compliance with Applicable Laws. The materials and services supplied under this Contract shall comply with all applicable federal, state and local laws, and the Contract shall maintain all applicable licenses and permits.

G. Survival of Rights and Obligations after Contract Expiration or Termination.

1. Contractor’s Representations and Warranties. All representations and warranties made by the Contractor under this Contract shall survive the expiration of termination hereof. In addition, the parties hereto acknowledge that pursuant to A.R.S. § 12-510, except as provided in A.R.S. § 12-529, the School District is not subject to or barred by any limitations of actions prescribed in A.R.S. Title 12, Chapter 5.

2. Purchase Orders. The Contractor shall, in accordance with all terms and conditions of the Contract, fully perform and shall be obligated to comply with all purchase orders received by the Contractor prior to the expiration or
termination hereof, unless otherwise directed in writing by the Procurement Offices, including, without limitation, all purchase orders received prior to but not fully performed and satisfied at the expiration or termination of this Contract.

7. School District’s Contractual Remedies

A. Right to Assurance. If the School District in good faith has reason to believe that the Contractor does not intend to, or is unable to perform or continue performing the Contract, the Procurement Officer may demand in writing that the Contractor give a written assurance of intent or ability to perform. Failure by the Contractor to provide written assurance within the number of days specified in the demand may, at the School District’s option, be the basis for terminating the Contract under the Uniform General Terms and Conditions.

B. Stop Work Order.

1. The School District may, at any time, by written order to the Contractor, require the Contractor to stop all or any part, of the work called for by this Contract for a period of up to ninety (90) days after the order is delivered to the Contractor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage.

2. If a stop work order issued under this clause is canceled or the period of the order or any extension expires, the Contractor shall resume work. The Procurement Officer shall make an equitable adjustment in the delivery schedule or Contract price, or both, and the Contract shall be amended in writing accordingly.

C. Non-exclusive Remedies. The rights and the remedies of the School District under this Contract are not exclusive.

D. Nonconforming Tender. Materials supplied under this Contract shall fully comply with the Contract. The delivery of materials or a portion of the materials in an installment that do not fully comply constitutes a breach of Contract. On delivery of nonconforming materials, the School District may terminate the Contract for default under applicable termination clauses in the Contract, exercise any of its remedies under the Uniform Commercial Code, or pursue any other right or remedy available to it.

E. Right to Offset. The School District shall be entitled to offset against any sums due the Contractor, any expenses or costs incurred by the School District or damages assessed by the School District concerning the Contractor’s nonconforming performance or failure to perform the Contract, including expenses, costs and damages described in the Uniform General Terms and Conditions.

8. Contract Termination

A. Cancellation for Conflict of Interest. Per A.R.S. 38-511 the School District may cancel this Contract within three (3) years after Contract execution without penalty or further obligation if any person significantly involved in initiating, negotiating, securing, drafting, or creating the Contract on behalf of the School District is, or becomes at any time while the Contract or an extension the Contract is in effect, an employee of or a consultant to any other party to this Contract with respect to the subject matter of the Contract. The cancellation shall be effective when the Contractor receives written notice of the cancellation unless the notice specifies a later time.

B. Gratuities. The School District may, by written notice, terminate this Contract, in whole or in part, if the School District determines that employment or gratuity was offered or made by the Contractor or a representative of the Contractor to any officer or employee of the School District for the purpose of influencing the outcome of the procurement or securing the Contract, an Amendment to the Contract, or favorable treatment concerning the Contract, including the making of any determination or decision about Contract performance. The School District, in addition to any other rights or remedies, shall be entitled to recover exemplary damages in the amount of three (3) times the value of the gratuity offered by the Contractor.
C. **Suspension or Debarment.** The School District may, by written notice to the Contractor, immediately terminate this Contract if the school District determines that the Contractor has been disbarred, suspended or otherwise lawfully prohibited from participating in any public procurement activity, including but not limited to, being disapproved as a Subcontractor of any public procurement unit or other governmental body.

D. **Termination for Convenience.** The School District reserves the right to terminate the Contract, in whole or in part at any time, when in the best interests of the School District without penalty recourse. Upon receipt of the written notice, the Contractor shall immediately stop all work, as directed in the notice, notify all Subcontractors of the effective date of the termination and minimize all further costs to the School District. In the event of termination under this paragraph, all documents, data and reports prepared by the Contractor under the Contract shall become the property of and be delivered to the School District. The Contractor shall be entitled to receive just and equitable compensation for work in progress, work completed, and materials accepted before the effective date of the termination. The cost principles and procedures provided in A.A.C. R7-2-1125 shall apply.

E. **Termination for Default.**

   1. In addition to the rights reserved in the Uniform Terms and Conditions, the School District reserves the right to terminate the Contract in whole or in part due to the failure of the Contractor to comply with any term or condition of the Contract, to acquire and maintain all required insurance policies, bonds, licenses and permits, or to make satisfactory progress in performing the Contract. The Procurement Officer shall provide written notice of the termination and the reasons for it to the Contractor.

   2. Upon termination under this paragraph, all documents, data and reports prepared by the Contractor under the Contract shall become the property of and be delivered to the School District.

   3. The School District may, upon termination of this Contract, procure, on terms and in the manner that it deems appropriate, materials and services to replace those under this Contract. The Contractor shall be liable to the School District for any excess costs incurred by the School District re-procuring the materials or services.

F. **Continuation of Performance through Termination.** The Contractor shall continue to perform, in accordance with the requirements of the Contract, up to the date of termination, as directed in the termination notice.

9. **Contract Claims**

All Contract claims and controversies under this Contract shall be resolved according to A.R.S. Title 15-213 and rules adopted thereunder.

10. **Offshore Performance**

Due to security and identity protection concerns, direct services under any subsequent contract shall be performed within the borders of the United States. Any services that are described in the specifications or scope of work that directly serve the school district(s) or charter school(s) or its clients and may involve access to secure or sensitive data or personal client data or development or modification of software for the State shall be performed within the borders of the United States. Unless specifically stated otherwise in the specifications, this definition does not apply to indirect or “overhead” services, redundant back-up services or services that are incidental to the performance of the contract. This provision applies to work performed by subcontractors at all tiers.
11. Contractor’s Employment Eligibility

By entering the contract, contractor warrants compliance with A.R.S. 41-4401, A.R.S. 23-214, the Federal Immigration and Nationality Act (FINA), and all other federal immigration laws and regulations.

The District may request verification of compliance from any contractor or subcontractor performing work under this contract. The District reserves the right to confirm compliance in accordance with applicable laws.

Should the District suspect or find that the contractor or any of its subcontractors are not in compliance, the District may pursue any and all remedies allowed by law, including, but not limited to: suspension of work, termination of the contract for default, and suspension and/or debarment of the contractor. All costs necessary to verify compliance are the responsibility of the contractor.

12. Terrorism Country Divestments

Per A.R.S. 35-392, the District is prohibited from purchasing from a company that is in violation of the Export Administration Act.

13. Scrutinized Business Operations

Per A.R.S. 35-391, the District is prohibited from purchasing from a company with scrutinized business operations in Sudan.

Per A.R.S. 35-393, the District is prohibited from purchasing from a company with scrutinized business operations in Iran.

In accordance with A.R.S. §§ 35-393, the Offeror is not currently engaged in, and agrees for the duration of the contract not to engage in, a boycott of Israel.

14. Fingerprint Clearance Cards

In accordance with A.R.S 15-512(H), a contractor, subcontractor or vendor or any employee of a contractor, subcontractor or vendor who is contracted to provide services on a regular basis at an individual school may be required to obtain a valid fingerprint clearance card pursuant to Title 41, Chapter 12, Article 3.1. An exception to this requirement may be made as authorized in Governing Board policy. Contractor, subcontractors, vendors and their employees shall not provide services on school district properties until authorized by the District. Additionally, contractor shall comply with Governing Board Policies of the Vail School District.

15. Registered Sex Offender Notification Restriction

Contractor represents and warrants that no employee of the Contractor, or of its subcontractor, who has been adjudicated to be a registered sex offender will perform work on District’s premises at any time without written approval of the District Representative.

Any breach of Contractor’s or any subcontractor’s warranty shall be deemed to be a material breach of this Contract, subjecting Contractor to penalties up to and including suspension or termination of this Contract. If the breach is by a subcontractor, and the subcontract is suspended or terminated as a result, Contractor shall be required to take such steps as may be necessary to either self-perform the services that would have been provided under the subcontract or retain a replacement subcontractor as soon as possible so as not to delay project completion.

Contractor shall advise each subcontractor of the District’s rights and the subcontractor’s obligations hereunder. Any additional costs attributable directly or indirectly to remedial action under this Article shall be the responsibility of Contractor.
16. Clarifications/Discussions

Clarification means communication with Offeror for the sole purpose of eliminating minor irregularities, informalities, or apparent clerical mistakes in the Bid. It is achieved by explanation or substantiation, either in response to an inquiry from the District or as initiated by Offeror. Clarification does not give Offeror an opportunity to revise or modify its Offer, except to the extent that correction of apparent clerical mistakes results in a revision.

17. Confidential Information

Confidential information request: If Offeror believes that its Bid contains trade secrets or proprietary information that should be withheld from public inspection, a statement advising the School District of this fact shall accompany the Bid, and the information shall be so identified wherever it appears. The School District shall review the statement and shall determine in writing whether the information shall be withheld. If the School District determines to disclose the information, the School District shall inform Offeror in writing of such determination.

18. Prohibition of Reprisals

The Vail School District is committed to complying with Federal requirements related to whistleblower protections. To that end, an employee may not be discharged, demoted, or otherwise discriminated against as a reprisal for disclosing, including a disclosure made in the ordinary course of an employee’s duties, to the Board, an inspector general, the Comptroller General, a member of Congress, a State or Federal regulatory or law enforcement agency, a person with supervisory authority over the employee (or such person working for the employer who has the authority to investigate, discover, or terminate misconduct), a court or grand jury, the head of a Federal agency, or their representatives, information that the employee reasonably believes is evidence of:

A. gross mismanagement of a contract or grant;
B. a gross waste of public funds;
C. a substantial and specific danger to public health or safety related to the implementation or use of public funds;
D. an abuse of authority related to the implementation or use of public funds; or a violation of law, rule, or regulation related to a school district contract (including the competition for or negotiation of a contract) or grant, awarded or issued relating to public funds.
SPECIAL INSTRUCTIONS TO OFFERORS

1. Pre-Bid Conference

A Pre-Bid Conference will be held at the time and location indicated on Page 1. The contractor is responsible to visit the site to ascertain the full extent of work required. No additional compensation will be allowed for failure to ascertain full extent of the work through visual inspection of existing conditions. All interested parties will have the opportunity for a visual inspection during the Pre-Bid Conference. Attendance to the pre-bid conference is highly recommended, but not mandatory in order to respond to this bid. Site visits shall not be scheduled separate of the pre-bid conference.

2. Inquiries

All questions regarding this IFB must be submitted by email no later than 2:00 p.m., Arizona Time, on March 04, 2021 to Tori Gamble at gamblet@vailschooldistrict.org AND copied to Phil Swaim from Swaim Associates, Ltd. Architects AIA at pswaim@swaimaia.com. The Offeror shall not contact any other individuals to obtain information concerning the solicitation or its contents.

3. Interpretations and Amendments

Should a Offeror find discrepancies in, or omissions from, the Solicitation Documents, or is in doubt as to their meaning, Offeror must at once notify the District, who will send a written instruction to each person receiving a set of documents. The Offeror submitting a request for interpretations will be responsible for its prompt delivery. All requests for interpretations shall be made in writing. The District will not be responsible for any explanations or interpretations except those duly issued in the form of written Amendment. Receipt of any Amendment so issued during the time of bidding shall be included in the bid and shall be acknowledged in the Bid and be made a part of the Contract Documents.

4. Purpose of Specifications

Specifications are designed to enable Offeror to satisfy a requirement for a product, material, process, or service. A specification may be expressed as a standard, part of a standard, or independent of a standard. No specification is intended to limit competition by eliminating items capable of satisfactorily meeting the requirements of the procurement. If Offeror believes a specification is unnecessarily restrictive, Offeror must indicate such in its bid.

5. Use of Brand Names

Brand names, trade names, model numbers, and/or catalog numbers are used to indicate the character, quality, and/or performance characteristics of the materials desired. Use of the name of a manufacturer, brand, make or catalog number does not restrict Offeror from offering suitable alternates. However, Vail Unified School District reserves the right to decide whether alternatives to the identified manufacturer and brand are equal to the materials, equipment described in the solicitation. Vail Unified School District will be the sole judge on the question of equal quality, and the District's decision shall be final.

6. Examination of Contract Documents and Project Site

A. Before submitting a Bid, Offerors shall carefully examine all of the Contract Documents and visit the Project site and fully inform themselves as to all existing conditions and limitations. Offerors shall include in their Bid a sum to cover the cost of all items included in the Contract. The Offeror, if awarded the Contract, shall not be allowed any extra compensation by reason of any matter or thing, concerning which such Offeror might have fully informed themselves prior to the bidding.

B. All quantities for bid submittal purposes are to be field verified by Offeror prior to submitting bid submittal. The Offeror is cautioned that it is the Offerors sole responsibility to submit information related to the evaluation categories and that the Vail Unified School District is under no obligation to solicit such information if it is not included with the
Offerors bid. Failure by the Offeror to submit such information may cause an adverse impact on the evaluation of the Offerors bid.

7. **Request for Approved Equal**

Identification of material or equipment by manufacturer's name or trade name is not meant to give preference to any manufacturer, but merely to establish a standard.

A. Offerors shall submit written requests to obtain approval to use unspecified products no later than **10:00 a.m on March 04, 2021**. Requests received after this time will not be considered. Requests shall clearly describe the product for which approval is asked, including data necessary to demonstrate acceptability. The District shall consider and either approve or reject all proposals submitted and shall comply with the following requirements:

1. If the District has approved an alternative product offering, the Offeror will be contacted with the approval and the Offeror’s Bidding Documents shall be modified to include the alternative products.

2. If the District rejects an alternative product proposal, notice of the rejection shall be given to the Offeror prior to the deadline for receiving bids. Notice shall include an explanation for rejection of the product.

B. The Offeror's request for approval of any substitution shall include all of the following:

1. Complete data substantiating compliance of the proposed substitution with the Contract Documents.
2. Product identification, including manufacturer's name, address and phone number.
3. Manufacturer's literature showing complete product description, performance and test data and all reference standards.
4. Samples and colors in the case of articles or products.
5. Name and address of similar projects on which the product was used and date of installation.
6. For construction methods, include a detailed description for proposed methods.
7. Itemized comparison of proposed substitutions with product or method specified.
8. An "Intent to Warranty” on letterhead from the manufacturer or reputable distributor listing Vail Unified District as the District with the School Site as the address.

C. Substitution requests shall be made on the "Substitution Request Form" included in this bid package.

D. The decision of the District regarding the approval of items for which substitution is requested will be final. In the event of an approved substitution, if such substitution is later determined by the District to be unacceptable for any reason, including the necessity to perform extended redesign or rework of the project in order to accommodate the substitution, or if it becomes apparent to the District that the substituted item will not perform or function as well as the specified item, the Offeror will be required to furnish the original specified item or request approval to use another substitution. The Offeror will pay all costs, expenses or damages associated with or related to the unacceptability of a substitution and the resultant utilization of any item. The Offeror further understands and agrees that a time extension will not be granted due to delays associated with or related to the unacceptability of a substitution.

E. If a substitution is approved; no subsequent change in brand or make will be permitted unless satisfactory written evidence is presented to the District that the manufacturer cannot make scheduled delivery of the approved substitute item.

F. Substitutions will not be considered for approval by the District prior to or after the award of the Contract if:
1. The proposed substitution is indicated or implied on shop drawings or product data submittals and has not been formally submitted for approval by the Offeror in accordance with the above stated requirements.

2. Acceptance of the proposed substitution will require substantial design revisions to the Contract Documents or is otherwise not acceptable to the District.

8. Approval of Equal Items of Equipment and/or Materials Before Submission of Bids

Time is of the essence for this project. If an Offeror wishes to use items of equipment and/or materials other than those identified by trade or manufacturer's name, model or catalog number in the Specifications, Offeror shall submit the request for approval to the District no later than 10:00 a.m. on March 04, 2021. Approvals will be granted only upon individual requests of prime bidding contractors. No approvals for substitutions will be granted directly to suppliers, distributors or subcontractors. Each request shall include all basic data and characteristics of the proposed item, so that a direct comparison can be readily made. It is the sole responsibility of the Offeror to submit complete descriptive and technical information so that the District can make a proper appraisal. All requests shall be in writing, addressed to Phil Swaim from Swaim Associates, Ltd. Architects AIA at pswaim@swaimaia.com, and Tori Gamble at gamblet@vailschooldistrict.org. If the District has approved an alternative product offering, the Offeror will be contacted with the approval and the Offeror’s Bidding Documents shall be modified to include the alternative products.

9. Submission of Bid Package

The bid package, also known as the Offer, should be prepared simply and economically, providing a straightforward, concise description of the capabilities to satisfy the requirements of the IFB. Emphasis should be on the completeness and clarity of content and should include the forms and information listed within this Section. Using the Bid Cover Sheet (Checklist) provided within the IFB is strongly recommended to ensure all necessary information is included for the submission of a bid package.

A. Questionnaire: A completed Questionnaire is required and provides pertinent details about the Offeror. Details sought in the Questionnaire include:

1. Company Profile
   A. Primary Office location and Contact details (address, phone numbers, email address, etc.)
   B. AZ ROC license(s)
   C. Litigation and Complaints
   D. Fingerprinting and Background Clearances

2. References: A minimum of three (3) references should be included for projects of similar scope in Arizona including the following details: District, Contact Person, Cell Phone Number, Email Address and Date of Project. The District, or Architect on behalf of the District, has the option to contact these references if deemed necessary.

B. Amendment Acknowledgement: The form shall be used to acknowledge any/all Amendments that may be issued. The form does not have to be submitted within the bid package if no Amendment(s) is issued. Signatures provided on this document serve as confirmation that the Offeror has reviewed and acknowledges any change, clarification or modification made to the original bid and/or related documents.

C. Bonding: All bonds shall be provided to Vail Unified School District and must be from Surety Companies licensed in the State of Arizona, with a General Power of Attorney and rated "A+" in Best's Guide.

1. Bid Bond: An irrevocable bid security payable to the Vail Unified School District in the amount of 10.00% of the total bid project cost is required. This security should be in the form of a bid bond, certified check, cashier's check, or cash and must be in the possession of the District by the due time and date cited for this solicitation.
2. Performance Bond: The contractor shall be required to furnish an irrevocable security in the amount of 100.00% of the total contract price payable to the Vail Unified School District, binding the contractor to provide faithful performance of the contract. This security must be in the possession of the District within 48 hours after receipt of purchase order or other notice of award. The cost of this bond is itemized on the bid submittal form.

Performance security shall be in the form of a performance bond, certified check or cashier's check. This security must be in the possession of the District within 48 hours after receipt of purchase order or other notice of award. If the contractor fails to execute the security document, as required, the contractor may be found in default and the contract terminated by the District. In case of default, the District reserves all rights to recover as provided by law. All performance bonds must be executed on forms substantially equivalent to the form included with this solicitation. Tills security must be in the possession of the District within 48 hours after receipt of purchase order or other notice of award.

3. Payment Bond: The Contractor shall be required to furnish non-revocable security for the protection of all persons supplying labor and material to the contractor or any subcontractor for the performance of any work related to the contract. Payment security shall be in the amount of 100% of the total contract price and be payable to the Vail Unified School District. The cost of this bond is included in your base bid.

Payment security shall be in the form of a payment bond, certified check or cashier's check. All payment bonds must be executed on forms substantially equivalent to the payment bond forms on file at the District and incorporated by this reference. This security must be in the possession of the District within 48 hours after receipt of purchase order or other notice of award.

D. Subcontractors: A completed Subcontractor form shall be included listing only one name for each branch of the work. This form should be included even if your firm is self-performing 100% of the work and not utilizing any Subcontractor(s). The Subcontractor list should be submitted in separate envelope in the bid package. It is the contractor's responsibility to know if their license classification is valid to perform the Scope of Work, as presented. Contractors listed on the Subcontractor form are only valid if the firm possesses a license for the specified type of work. The Subcontractor list may not be changed from as submitted without the District's written approval.

E. Confidential Information: If a person believes that any portion of a proposal, bid, offer, specification, protest or correspondence contains information that should be withheld, then the Procurement Officer shall be so advised in writing (price is not confidential and will not be withheld). Such material shall be identified as confidential wherever it appears. The District, pursuant to R7-2-1016, shall review all requests for confidentiality and provide a written determination. If the confidential request is denied, such information shall be disclosed as public information, unless the person utilizes the 'Protest' provision as noted in R7-2-1142.

F. Bid Pricing Submittal: Offerors must submit their pricing as outlined on the Bid Pricing Submittal form. Additions and subtractions will be determined upon project completion. These line items are to be added to the Base Bid and other line items listed to provide the overall Total Bid Project Cost. Other items listed on the Bid Pricing Submittal include:

1. Restatement of Work: The Restatement of Work should provide a few short sentences detailing the major tasks involved in the project and include the product(s) being used. A statement such as "per plans and specs" does not qualify as indication of understanding of the Scope of Work and is not acceptable. This Restatement of Work should also include the major product(s) being used for the project. Failure to provide the restatement demonstrating competence and understanding of the Scope of Work and specifications for the project could result in the bid being determined non-responsive.

2. Schedule (Based on Notice to Proceed): On your letterhead, a schedule based on Notice to Proceed through Substantial Completion (90 days) should be provided and include milestones for the project.

G. Vendor Payment Form: A completed Vendor Payment form provides necessary information for the District to create a purchase order and subsequent payments and should be included in the bid package.
H. **Asbestos Certification - Notarized:** The completed form should be notarized and included in the bid package to attest that all materials to be used in the project are and shall be free of asbestos.

I. **Offer and Acceptance:** Offeror shall include a signed Offer and Acceptance Form. The Offer and Acceptance Form shall be signed with an original signature by an Authorized Representative of the Offeror, and shall be submitted with the submitted bid no later than the Offer due date and time. Failure to return a signed Offer and Acceptance Form may result in rejection of the Offer.

J. **Deviations and Exceptions:** The form shall be completed if there are any deviations/exceptions to the information found within the Invitation for Bid. Any deviation or exception not included on the form provided shall be without force and effect in any resulting Contract. Failure to show specific deviations indicates full compliance with the IFB.

K. **Conflict of Interest:** A statement disclosing any relationship with a District Employee or Governing Board member must be included in the bid package.

L. **Drug-Free Workplace:** The form indicates if your firm has a policy in place or not and should be included in the bid package.

M. **Non-Collusion – Notarized:** Offeror attests that the bid is genuine, is neither a sham nor collusive, nor is made in the interest for or on behalf of any person or corporation not named within the bid. The Offeror has not in any manner sought by collusion or anti-competitive means or practices to secure for itself an advantage over any other Offeror. It also certifies that the Offeror has not directly or indirectly induced or solicited any other Offeror to put in a sham or collusive bid, or induced or solicited any other Offeror to refrain from submitting an offer. This form shall be notarized.

N. **I.R.S. W-9 Form, Request for Taxpayer Information:** Offeror should submit a current I.R.S. W-9 Form with the bid package. The W-9 form is required in order to receive payment under the Contract.

O. **Vendor Application Form:** Offeror should submit a current Vendor Application Form with the bid package. The vendor application form is required in order ensure correct order and payment information under this Contract.

10. **Offer Submission, Due Date and Time**

It is the Offeror’s responsibility to ensure that the bid package is delivered on the due date by the time required. Delivery times vary for all packages delivered to the Vail Unified School District. If packages are received after the due date and time specified in the solicitation due to carriers like UPS or Fed Ex delivering late, Vail Unified School District will not be held responsible and the late bid package will not be considered.

11. **Evaluation**

A. **Opening:** Sealed bids received by the correct time and date shall be opened and each Offeror’s pricing shall be publicly read. All other information contained in the Offer shall remain confidential until award is made.

B. **Evaluation Criteria:** Bids may not be considered responsive and/or acceptable if they do not contain information sufficient to perform the necessary vetting of information requested in the IFB. Necessary components include an indication of the Offeror’s intent to be bound, bid pricing submittal, acknowledgement of amendment(s), appropriate bonds, warranty information, company profile and any pertinent reference data as required. As stated in the Uniform Instructions, Exceptions to the Terms and Conditions may impact a Offeror's susceptibility for award. Once the bid package is determined responsive and the Offeror is determined to be responsible, price is the most important factor. A tally sheet will be developed with the pricing and costs requested in the IFB.
C. **Clarification of Bid Submittals:** Clarification means communication with Offeror for the sole purpose of eliminating minor irregularities, informalities, or apparent clerical mistakes in the Bid. It is achieved by explanation or substantiation, either in response to an inquiry from the District or as initiated by Offeror. Clarification does not give Offeror an opportunity to revise or modify its Offer.

D. **Responsibility, Responsiveness and Acceptability:** In accordance with R7-2-1076, R7-2-1161, R7-2-1168, R7-2-1171, and R7-2-I003 (B), R7-2-I031 or R7-2-1046, the District shall consider the following in determining Offeror’s responsibility as the responsiveness of bids submitted in response to the solicitation. Determinations of non-responsibility and/or non-responsiveness shall be made in writing and shall set forth the bases for the determination. Bids determined to be non-responsive and/or non-responsible shall prevent the bid from evaluation and the Offeror shall be notified accordingly.

1. **Mandatory Responsiveness Requirements:**
   a. A Signed Offer Form is included;
   b. A Bid Bond is included;
   c. Offeror possesses a valid license to perform the Scope of Work identified;
   d. Offeror does not have any unresolved issues at the Arizona Registrar of Contractors;
   e. Offeror does not have any unresolved issues with previous District; and
   f. References demonstrating experience with similar projects of size and scope in Arizona.

2. **Debarment, Suspension or Contract Termination**
   Offerors may not be considered responsible if they have been debarred from the practice of their profession that would otherwise be necessary in the provision of goods and services under any resulting contract. Offerors may not be considered responsible if they have had a contract with the District, within the last three-years, that was terminated for cause, due to breach or similar failure to comply with the terms of any such contract. Offerors may also not be considered responsible if there is factual evidence of their frequent and reoccurring failure to satisfy the terms of their agreements and contractual relationships, both with the District or other government entities. Factual evidence shall consist of any documented vendor performance reports, customer complaints and/or negative references.

3. **Bid Submittal Package**
   Bids may not be considered responsive if they are not submitted in the requested format; if they include significant exceptions to any requirements, terms or conditions that render the bid unacceptable; or do not contain sufficient contents with which to evaluate the bid, e.g., bonds, product information, key personnel, references, pricing and/or other requested information. Failure to submit all requested information may result in rejection of the bid.

4. **Additional Responsibility Factors**
   a. The proposed contractor's stability, material, personnel and other resources, including subcontractors;
   b. The proposed contractor's record of performance and integrity;
   c. Whether the proposed contractor is qualified legally to contract with the public entity;
   d. Whether the proposed contractor supplied all necessary information concerning its responsibility;
   e. Complaints on file with the Registrar of Contractors;
f. Prior litigation history; and References.

12. Award

A. Contract Award: An award will be made to the lowest responsive and responsible Offeror that conforms in all material respects to the requirements outlined in the Invitation for Bid. The District reserves the right to award the base bid and any combination of alternates, if any, that is deemed most advantageous to the District in determining the lowest responsible and responsive Offeror. If an Offeror is awarded a contract and is unable to meet its contractual obligations, Vail Unified School District may cancel the Contract and award to the next lowest ranked Offeror if the determination occurs within a reasonable time period after original Contract Award.

B. Contract Implementation Meetings: The Contractor may be required to participate in meetings for the successful implementation of the contract. Meetings, if any, will be at the discretion of the District. The Contractor will be notified in advance of any meeting times, frequency for future meetings, if any, and locations to ensure all appropriate district and contractor staff/representatives attend. The District reserves the right to decline conference call attendance or participation.
SPECIAL TERMS AND CONDITIONS

1. Purpose

The purpose of this solicitation is to hire a qualified firm who can provide services for the construction of the Mechanic Shop Expansion located at the Vail Unified School District Transportation Department Bus Yard. The project includes, but is not limited to: metal framing, acoustical ceiling installation, thermal and moisture protection, painting, joint sealants, plumbing, electrical, millwork, installation of door and windows, installation of a communication system, install signage, etc. Alternates have also been included within the scope of work. Specifications regarding the scope of work to include the alternates has been identified within Attachment A – Specifications Vail Mechanic Shop Expansion.

2. Site Visit

The contractor is responsible to visit the site to ascertain the full extent of work be required. No additional compensation will be allowed for failure to ascertain full extent of the work through visual inspection of existing conditions. All interested parties will have the opportunity for a visual inspection during the Pre-Bid Conference. Attendance to the pre-bid conference is highly recommended, but not mandatory, in order to respond to this bid. Site visits shall not be scheduled separate of the pre-bid conference.

3. Contract

This contract between the District and the Contractor shall consist of the solicitation as amended, any requests for clarifications, and the bid submitted by the Contractor. In the event of a conflict in language between the documents referenced above, the provisions and requirements set forth and/or referenced in the solicitation as amended shall govern. However, the District reserves the right to clarify any contractual requirement in writing and such written clarification shall govern in case of conflict with the applicable requirements stated in the solicitation as amended or the Contractor's bid. In all other matters not affected by the written clarification, if any, the solicitation shall govern.

4. Contract Type

This contract is a Fixed Firm Price.

5. Price Clause

Prices shall be firm for the term of the contract. Prices as stated must be complete for the services offered and shall include all associated costs.

6. Substitute Securities

The District will accept substitute securities in lieu of retention only in strict compliance with R7-2-11 14. If satisfactory progress is made on the Project, one-half of the funds held as substitute security will be returned upon fifty percent (50%) completion of the Project. Interest on all substitute securities will be held until final payment. All requests for substitute securities must be made on District approved forms, copies of which may be obtained from the District upon request.

7. Investigation by Offeror

By submitting a bid, the Offeror certifies the Offeror has investigated all required fees, permits and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the costs of such fees, permits and requirements not otherwise indicated as provided by the District.

8. Contract Award

The District intends to award a fixed firm price contract to a single Offeror, unless otherwise indicated, resulting from this solicitation to the responsible Offeror whose bid represents the best value after evaluation in accordance with the criteria...
identified in the solicitation. The District may waive informalities and minor irregularities on bids received. The Offeror’s initial bid should contain the Offeror’s best terms from a price or cost and technical standpoint. The District reserves the right to make an award on any item for any quantity less than the quantity offered, at unit costs or prices offered, unless the Offeror specifies otherwise in the bid. The District may reject any or all bids if such action is in the District's best interest.

9. Terms of Award

It is the intent of the District to recommend a single award of this contract to the Vail Unified School District Governing Board.

10. Award Basis

The successful Offeror(s) will be determined by the Evaluation Criteria, as presented. Awards will not be made based on price alone, as the Offeror must be responsive and responsible. The District reserves the right to award as many contracts for the services as may be in the best interest of the District. If a contractor receives a bid award, an order is placed and contractor is unable to meet the delivery requirements, meet service requirements, or material that meets the Districts needs as outlined in this Invitation for Bid, or is unable to hold bid price, or fails to provide product or service within a reasonable period of time, AND/OR fails to provide product complying with bid specifications, as determined by the District, the District reserves the right to go to the next lowest bid price of equal quality which meets bid specifications. If the bid item delivered does not meet specifications or is received in an unsatisfactory condition and is in a damaged or unusable condition, or if service is unsatisfactory, contractor must pick up item immediately and replace to the District's satisfaction at no additional charge, or issue full credit, for service a return visit must be re-scheduled within 24 hours. Rejected items must be removed from the District's premises by the Offeror upon verbal notification.

However, if a Offeror receives a contract award and is unable to meet the service requirements as outlined in this Solicitation (and subsequent contract), or is unable to hold the contract price, or fails to provide acceptable service as determined by the District, the District reserves the right to go to the next highest ranked Offeror if this determination occurs within a reasonable time period after contract award.

11. Retention

A Project Representative from Swaim Associates, Ltd. Architects AIA, and the Vail Unified School District Director of Facilities, Jerry Wood shall perform the final inspection. R7-2-1104 requires 10% retention of the total cost of the job will be held until the final inspection is accepted by the District. The Contractor shall seek written approval from an appropriate District Representative for any changes or deviations from specifications or instructions.

12. Progress Payments

Progress payments may be allowed. Requests for payment must be submitted through Phil Swaim for approval and sign-off. Retention, often percent (10%) of the requested payment, will be withheld until the final punch list is completed.

On or about the first day of each calendar month during the course of construction, the Contractor shall submit an itemized Application to Phil Swaim supported by such data substantiating the Contractor's right to payment as the District or Swaim Associates, Ltd. Architects AIA may require.

Payment shall be based on the work actually performed during the preceding calendar month. Payment may be made for equipment not yet installed but delivered and suitably stored at the project site, or at some other location agreed upon in writing by Swaim Associates, Ltd. Architects AIA and the District to be transported to the site and installed at a later date, under such conditions agreed upon in writing by the District.

Material delivered and suitably stored at the project site, or at some other agreed upon location by the Contractor, subcontractors, sub-subcontractors or material suppliers shall be insured to the full value of the material and shall be suitably stored and protected. Any material that is in accordance with the Contract Documents shall be installed into the
Work. Until the final acceptance of the building by the District, it shall be the Contractor's responsibility to protect all materials and equipment installed or delivered to the Project.

The Contractor warrants and guarantees that title for all Work, materials and equipment covered by the Contract Documents shall be passed to the District upon final acceptance and that such Work, materials and equipment shall be free and clear of all liens, claims, security interests or encumbrances.

13. Approvals for Payment

If the Contractor has submitted an Application as above (Progress Payments), then not later than the fifth day of the month, Swaim Associates, Ltd. Architects AIA shall approve or otherwise act on the Application and forward the Application to the District immediately for such amount as determined to be properly due, or state in writing the reasons for withholding a part of or the entire amount of the amount applied for as provided in the Subsection, Payments Withheld.

Approval of the Application will constitute a representation by Swaim Associates, Ltd. Architects AIA to the District, based on observations at the site, As-Built drawings reflect current information and the data comprising the Application, that the Work has progressed to the point indicated; that, to the best of Swaim Associates, Ltd. Architects AIA knowledge, information and belief, the equality of the Work is in accordance with the Contract Documents (subject to (1) an evaluation of the Work as a functioning whole upon Substantial Completion, (2) to the results of any subsequent test required by the Contract Documents, (3) to minor deviations from the Contract Documents correctable prior to final completion, and (4) to any specific qualifications stated in his approval of the Application); and that the Contractor is entitled to payment in the amount approved. In addition, Swaim Associates, Ltd. Architects AIA final approval for payment will constitute a further representation that all the conditions precedent to the Contractor's being entitled to final payment has been fulfilled.

14. Payments Withheld

Swaim Associates, Ltd. Architects AIA may decline to approve an Application and may withhold a Certificate in whole or in part if unable to make representations to the District as provided in Approvals for Payment. Swaim Associates, Ltd. Architects AIA may also decline to approve any Application or, because of subsequently discovered evidence or subsequent inspections, may nullify the whole or any part of any Certificate for Payment previously issued to such extent as may be necessary if within a professional opinion to protect the District from loss because of:

A. Defective work not remedied;
B. Claims filed or reasonable evidence indicating probable filing of claim;
C. Failure of the Contractor to make payments to Subcontractors or for labor, materials or equipment;
D. Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Sum;
E. Damage to another contractor;
F. Reasonable indication that the Work will not be completed within the Contract Time; or
G. Unsatisfactory prosecution of the Work by the Contractor.

15. District’s Right to Request Completion of Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, or fails to perform any provision of the Contract, the District shall after seven days' written notice to the Contractor, and without prejudice to any other remedy he may have, notify the bonding company of such default or lack of performance, and proceed to make such other necessary and reasonable arrangements to carry out the work in accordance with the Contract Documents, all at the expense of the Contractor, including the District’s costs and attorneys' fees.

16. Key Personnel
It is essential that the contractor provide adequate experienced personnel, capable of and devoted to the successful accomplishment of work to be performed under this contract. The contractor must agree to assign specific individuals to the key positions.

A. The contractor agrees that, once assigned to work under this contract, key personnel shall not be removed or replaced without written notice to the District.

B. If key personnel are not available for work under this contract, for a continuous period exceeding 3 calendar days, or are expected to devote substantially less effort to the work than initially anticipated, the contractor shall immediately notify the District, and shall, subject to the concurrence of the District, replace such personnel with personnel with personnel of substantially equal ability and qualifications.

17. **Insurance**

Offeror agrees to maintain such insurance as will fully protect Offeror and the District from any and all claims under any workers' compensation statute or unemployment compensation laws, and from any and all other claims of any kind or nature for damage to property or personal injury, including death, made by anyone, that may arise from work or other activities carried on, under, or facilitated by this Agreement, either by Offeror, its employees, or by anyone directly or indirectly engaged or employed by Offeror. Offeror agrees to maintain such automobile liability insurance as will fully protect Offeror and the District for bodily injury and property damage claims arising out of the ownership, maintenance or use of owned, hired or non-owned vehicles used by Offeror or its employees, while providing services to the District.

Successful Offeror will be required to provide proof of and maintain comprehensive general liability insurance with a limit of not less than $1,000,000 per occurrence and $2,000,000 aggregate coverage with a deductible of not more than $5,000 and naming Vail Unified School District as an additional insured party. Successful Offeror will be required to submit proof of and maintain Worker's Compensation and Employer's Liability Insurance as required by law.

18. **Acceptance Period**

In order to allow for an adequate evaluation, the District requires an offer in response to the solicitation to be valid and irrevocable for 60 days after the opening time and date.

19. **Timeframe For Completion**

Work shall commence on upon award, and the notice to proceed. The substantial completion date for all work is 90 days after the notice to proceed. Work shall be continuous and final completion review will take place 120 days after the notice to proceed.

20. **District's Contingency Allowance**

The District is not providing any contingency allowance for this solicitation.

21. **Liquidated Damages**

If the selected Offeror fails to meet the substantial time requirements for the delivery and/or installed acceptable implementation of the project, liquidated damages of $1,000 per day may be assessed for each day beyond sunset 180 days after notice to proceed. However, should an unforeseen problem arise, an extension may be granted in writing at the discretion of the District. Final completion must be by sunset 180 days after notice to proceed.

If the selected Offeror shall fail or refuse to complete the work within the time specified, then the selected Offeror shall agree as a partial consideration for the awarding of the contract, that the Vail Unified School District may retain from compensation otherwise to be paid to the selected Offeror, or may recover by all remedies at law, the amount specified,
not as penalty but as liquidated damages, for each and every calendar day that the selected Offeror shall be default after the time stipulated in the bid for completion of substantial work status and final completion.

22. **Inspection**

The job will have a final inspection and acceptance by the Vail Unified School District Director of Facilities, Jerry Wood. Any discrepancies noted during the inspection will be corrected prior to final payment. Field inspections will be performed by Phil Swaim of Swaim Associates, Ltd. Architects AIA and a representative of the Vail Unified School District upon completion of the Project.

23. **Damages**

The successful contractor shall be liable for any and all damage caused by the firm and or its employees to the Vail Unified School District premises. The Offeror shall hold and save the Vail Unified School District free and harmless from liability of any nature or kind arising from any use, trespass, or damage occasioned by Offeror's operations on premises or third persons.

24. **Source Limitations**

Obtain materials from the source or producer that will provide the required warranty.

25. **Licenses**

Contractor shall maintain in current status all federal, state and local licenses, bonds and permits required for the operation of the business conducted by Contractor. Contractor shall remain fully informed of and in compliance with all ordinances and regulations pertaining to the lawful provision of services under the Contract. The District reserves the right to stop work and/or cancel the contract of any Contractor whose license(s) expire, lapse, are suspended or terminated.

26. **Compliance with Specifications**

The fact that a manufacturer, supplier or Offeror chooses not to produce or supply equipment, supplies or services to meet the specifications will not be considered sufficient cause to adjudge the specifications as restrictive. Offerors shall offer equipment, supplies, and/or services that meet the specifications as presented. The work shall meet the minimum industry standards, as applicable:

- A. American Coating Association (ACA)
- B. American Concrete Institute (ACI)
- C. American Institute of Architects (AIA)
- D. American National Standards Institute (ANSI)
- E. American Standards Association (ASA)
- F. American Society of Safety Engineers (ASSE)
- G. American Society for Testing and Materials (ASTM)
- H. Asphalt Roofing Manufacturers Association (ARMA)
- I. Construction Specifications Institute (CST)
- J. Factory Mutual (FM)
- K. International Energy Conservation Code (IECC)
- L. International Fire Code (IFC)
- M. International Mechanical Code (IMC)
N. International Plumbing Code (IPC)
0. National Electrical Code (NEC)
P. National Demolition Association (NDA)
Q. National Electrical Code (NEC)
R. National Emission Standards for Hazardous Air Pollutants (NESHAP)
S. National Roofing Contractors Association (NRCA)
T. Sheet Metal Air Conditioning National Association (SMACNA)
U. Spray Polyurethane Foam Alliance (SPFA)
V. Tile Council of North America (TCNA)
W. The Society for Protective Coatings (SSPC)
X. Underwriter's Laboratories, Inc. (UL)
Y. Western States Roofing Contractors Association (WSRCA)

27. Warranty and Quality Guarantee

Contractor warrants that any equipment or material supplied to the District shall fully conform to all requirements of the contract and all representations of contractor, and shall be fit for all purposes and uses required by the contract.

28. A. Contractor's Warranty: Provide 2-year warranty for all content, as required by the Arizona Registrar of Contractors.


The Contractor shall comply with the Americans with Disabilities Act of 1990 (Public Law 101-336) and the Arizona Disability Act of 1992 (A.R.S § 41-1492 et. seq.), which prohibits discrimination of the basis of physical or mental disabilities in delivering contract services or in the employment, or advancement in employment of qualified individuals.

Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contracting the procurement officer for the solicitation. Request should be made as early as possible to allow time to arrange the accommodation.

30. Fingerprinting Requirements

The District anticipates that services under this contract may cause the contractor and proposed subcontractors to have direct, unsupervised contact with pupils. In accordance with A.R.S. 15-512(H), a contractor, subcontractor or vendor or any employee of a contractor, subcontractor or vendor who is contracted to provide services on a regular basis at an individual school shall be required to obtain a valid fingerprint clearance card pursuant to title 41, chapter 12, Article 3.1. Therefore, the Contractor and any proposed subcontractors warrant compliance with A.R.S. subsection 41-4401, A.R.S. subsection 23-214, the Federal Immigration and Nationality ACT (FINA) and all other federal, state and local immigration laws and regulations related to the immigration status of its employees. The contractor must have all employees on-site submit to a fingerprint clearance conducted by Department of Public Safety and all employees must carry fingerprint card at all times. These warranties shall remain in effect through the term of the contract.

The District may, at its sole discretion, require evidence of compliance during the evaluation process or contract term. Should the District request evidence of compliance, the Contractor and any proposed subcontractors shall have 5 working days from receipt of the request to supply adequate information. Failure to supply the requested information or if the District suspects or finds the Contractor or any of its subcontractors are not in compliance, the District may pursue any and all remedies allowed by law, including, but not limited to: non consideration of contract award, suspension of work,
termination of the contract for default, and suspension and/or debarment of the Contractor. All costs associated with verification and any remedies are the sole responsibility of the Contractor and any proposed subcontractor.

31. Hazard Notification

Contractor must advise Director of Facilities, Jerry Wood, whenever work is expected to be hazardous to school children, District employees and/or operators. In the event that these or other hazardous materials are identified, it must be brought to the attention of Phil Swaim at Swaim Associates, Ltd. Architects AIA immediately to determine remediation efforts.

32. Regulatory Agencies

It will be necessary that all work meet the requirements of all Federal, State and local regulatory agencies.

33. Buy American Provision

Contractor will purchase, to the maximum extent practicable, domestic commodities or products in accordance with 7CFR§210.21(d) and 7CFR§220.16(d). Contractor shall purchase, to the maximum extent practicable, domestic agricultural commodities or products substantially processed in the United States. “Substantially” means the final processed product contains over 51% domestically grown agricultural commodities. This provision applies to all food purchases paid from the nonprofit school food services account. There are limited exceptions to this provision which allow for the purchase of products not meeting the “domestic” standard as described above (“non-domestic”) in circumstances when use of domestic products is truly not practicable. However, before utilizing an exception, alternatives to purchasing non-domestic food products should be considered.

34. Small Businesses, Minority-Owned Firms, and Women’s Business Enterprises

In accordance with OMB Circular A-110, the District shall make a positive effort to utilize small businesses, minority-owned firms, and women’s business enterprises (SMWBE), whenever possible by 1) ensuring that SMWBE are used to the fullest extent practicable; 2) making information on forthcoming opportunities available and arranging time frames for purchases and contracts to encourage and facilitate participation by SMWBE; 3) considering in the contract process whether firms competing for larger contracts intend to subcontract with SMWBE; 4) encouraging contracting with consortiums of SMWBE when a contract is too large for one of these firms to handle individually; and 5) using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Department of Commerce’s Minority Business Development Agency in the solicitation and utilization of SMWBE.

35. Disclosure of Lobbying Activities

Pursuant to Byrd Anti-Lobbying Amendment 31 USC 1352, Contractor must disclose lobbying activities in connection with school nutrition programs. If there are material changes after the initial filing, updated reports must be submitted on a quarterly basis. 7CFR§3018.100 (Only applies to contracts over $100,000)

36. Certification Regarding Lobbying

Pursuant to 31 USC 1352, Contractor must submit a certification regarding lobbying which conforms in substance with the language provided in C.F.R. Part 200.450. By signing the Offer & Acceptance form, Contractor shall certify that no appropriated funds may be expended by the recipient of a Federal contract, grant, loan, or cooperative Agreement to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions. (Only applies to contracts over $100,000)
37. Certificate of Independent Price Determination

Offeror agrees that all prices in this Offer have been arrived at independently, without consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Offeror or with any competitor certification regarding non-collusion.

38. Civil Rights Compliance

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, sex, disability, age, or reprisal or retaliation for prior civil rights activity in any program or activity conducted or funded by USDA.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the Agency (State or local) where they applied for benefits. Individuals who are deaf, hard of hearing or have speech disabilities may contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html, and at any USDA office, or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

39. Clean Air Act, Clean Water Act, and Environmental Protection Agency Regulation

Contractor shall comply with all applicable standards, orders or requirements issued under Section 306 of the Clean Air Act, Section 508 of the Clean Water Act, Executive Order 11738 and Environmental Protection Agency regulations which prohibit the use, under nonexempt federal contracts, grants or loans to facilities included on the EPA List of Violating Facilities. The District will report all violations to ADE and to the USEPA Assistant Administrator for Enforcement. (Only applies to contracts over $100,000)

40. Contract Work Hours and Safety Standard Act

Contractor shall comply with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327–330) as supplemented by Department of Labor regulations (29 C.F.R. Part 5). (Only applies to contracts over $2,500)

41. Debarment, Suspension, Ineligibility and Voluntary Exclusion

By signing the Offer & Acceptance form, Contractor shall certify that they have not been debarred, suspended, or otherwise excluded from or ineligible for participation in federal assistance programs under executive order 12549 and 12689. Contractor shall comply with regulations implementing Office of Management and Budget Guidance in Non-procurement Debarment and Suspension codified at 2 C.F.R. Part 180 and 2 C.F.R. Part 417. These regulations restrict transactions with certain parties that are debarred, suspended or otherwise excluded from, or ineligible for, participation in Federal assistance programs or activities. (Only applies to contracts over $25,000)

42. Energy Policy and Conservation Act

Contractor shall meet 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. (Pub. L. 94–163, 89 Stat. 871.)
43. Equal Employment Opportunity


44. Record Keeping

The books, documents, papers and records of Contractor pertaining to operations under this Agreement shall be available to the District at any reasonable time. These records are subject to inspection or audit by duly authorized representatives of the District, State Agency, the US Department of Agriculture, and the US General Accounting Office at any reasonable time and place.

The District shall maintain such records, for a period of not less than five (5) years after the final day of the contract, or longer if required for audit resolution (A.R.S §35-214). 7CFR§210.23 and 2 C.F.R. Part 200.318(i).

45. Invoicing

Contractor fully discloses all discounts, rebates, allowances and incentives received by Contractor from its suppliers. If Contractor receives a discount, rebate, allowance, or incentive from any supplier, Contractor must disclose and return to the District the full amount of the discount, rebate, or applicable credit that is received based on the purchases made on behalf of the District. Contractor must identify the amount of each discount, rebate and other applicable credit on bills and invoices presented to the school food authority for payment and individually identify the amount as a discount, rebate, or in the case of other applicable credits, the nature of the credit. 7CFR§210.21(f)(1)(iv).

No expenditure may be made from the nonprofit school food service account for any cost resulting from a cost-reimbursable contract that fails to include the requirements of 7CFR§210.21, nor may any expenditure be made from the nonprofit school food service account that permits or results in Contractor receiving payments in excess of the Contractor’s actual, net allowable costs. 7CFR§210.21 (f)(2)

46. Termination Clause

The contract may be terminated for cause and for convenience by the District. Appendix II to 2 C.F.R. Part 200. (Only applies to contracts over $10,000).

47. Other Requirements

This is an occupied school campus where the educational process comes first. Therefore, scheduling is essential to completing the project successfully. Significant coordination is required in terms of work processes to avoid disruption of the educational environment. Thus, the ultimate standards must be in place:

A. Sign-in and present positive identification;
B. Park in assigned locations;
C. No weapons in vehicles or on campus;
D. No smoking on campus;
E. No foul or offensive language;
F. No alcohol or tobacco use of any kind on campus to include on person, in vehicles or equipment;
G. No clothing referencing any of the above;
H. No speaking to students;
I. No leering or whistling;
J. Site must be safe at the end of each day;
K. These are no tolerance terms.
SCOPE OF WORK

Project
Vail Mechanic Shop Expansion

Contractor Requirements
Contractor shall have a minimum of five (5) years of experience in new construction services.

Drawings, Detailed Scope of Work and Specifications
See attached construction documents from Swaim Associates, Ltd. Architects AIA titled:
Attachment A: Specifications “Vail Mechanic Shop Expansion” and
Attachment B: Construction Documents “Vail Mechanic Shop Expansion”

New Materials/Equipment
All materials and equipment shall be new. Refurbished materials and equipment will not be accepted.

Preconstruction Meeting
This date will be established after the award of contract.

Site Information
Vail Unified School District 20, Transportation Department, Bus Yard
13192 E. MaryAnn Cleveland Way, Vail, AZ 85641
Office Hours: 8:00am – 4:00pm
Phone: (520) 879-2454, Director of Transportation, or (520) 879-1054 Transportation Supervisor

Work Hours
Work hours for this project are to be worked out between the Director of Facilities, Jerry Wood, the Director of Transportation, Jerry Brown, and the awarded Offeror.

Utilities
Contractor shall provide, and maintain in clean order, temporary toilet facilities for use throughout the project duration. Locations shall be approved by the District.

Cleanup
The Contractor, at all times, shall keep the premises free from accumulation of waste materials or rubbish caused by construction operations. Upon completion of the work, remove all waste materials and rubbish from and about the Project, as tools, construction equipment, machinery and surplus materials. If the Contractor fails to clean up the work, the District may do so and the cost thereof shall be charged back to the Contractor. Remove all surplus materials and debris of every nature resulting from operations, and put the site in a neat, orderly condition. District trash receptacles shall not be utilized without specific written approval.

Worksite Safety Restoration
The contractor shall repair, rebuild or otherwise acceptably restore any property on or adjacent to the worksite that was damaged during the course of work on the project. Such restoration shall be at the contractor's expense, and is not subject to reimbursement by the District. Awarded firm shall remove all old equipment, trash/waste from the worksite as a result of their efforts.

General Project Notes
A. The Bus Maintenance building and site shall remain in operation during construction. The existing wall between the new and existing shall remain in place as long as possible, and a secure temporary barrier is required once removed until the building is enclosed. 48-hour notice is required prior to any utility disruptions.

B. Smoking and all other tobacco products are not allowed on site.
C. Before the project will be classified as "final completion," the Contractor will develop and complete a punch list. The Owner and Architect will determine when the project meets "final completion." A punch list must be established and completed within the project calendar day time frame.

Questions

Offerors who have questions about this IFB are required to submit their questions, by email, to Tori Gamble at gamblet@vailschooldistrict.org AND copied to Phil Swaim from Swaim Associates, Ltd. Architects AIA at pswaim@swaimaia.com. All questions must be submitted by March 04, 2021 at 10:00 a.m., Arizona Time. Responses will be addressed in an Addendum to the IFB if necessary. Addendums must be acknowledged where designated in the solicitation. The purpose of the Addendum is to clarify, if necessary, the terms of this Invitation for Bid, and to prevent any misunderstanding of the District’s intention in this matter. If anyone should have a discrepancy in, or omission from, the general terms and conditions of this Invitation for Bid, or if in doubt as to their meaning, such matters should be presented in writing.

Phone calls with questions or requests for information regarding the Invitation for Bid will not be accepted. Oral statements or instructions will not constitute an amendment to this Invitation for Bid. Please submit any questions or discrepancies to Tori Gamble at gamblet@vailschooldistrict.org. We recommend you request a delivery and read receipt of all e-mails sent to the District regarding this solicitation.
SUBSTITUTION REQUEST FORM

If your organization is offering substitution equipment for consideration submit this completed form via email to:

Vail Procurement Analyst, Tori Gamble, at gamblet@vailschooldistrict.org and Phil Swaim representative, Swaim Associates, Ltd. Architects AIA, at pswaim@swaimaia.com no later than 10:00 a.m. Arizona Time, March 04, 2021.

The following is hereby submitted for consideration to use the following product in place of the specified model: XXX.

Proposed Substitution:

________________________________________________________________________________________

The complete product description, drawings, photographs, performance and test data and other information necessary for evaluation are found attached, including specific model numbers, finishes, options, etc.

A. Is the "Intent to Warranty" from the manufacturer or reputable distributor attached listing the School Site address and Vail Unified School District as the Owner?

Yes ___  No ___  If No, explain: _____________________________________________________________

B. Are changes required to the current project design in order to properly install proposed substitutions? Is the weight equal?

Yes ___  No ___  If No, explain: _____________________________________________________________

C. Will the undersigned pay for changes to the project design, including engineering and drawing costs, caused by requested substitutions?

Yes ___  No ___  If No, explain: _____________________________________________________________

D. List differences between proposed substitution(s) and specified item. (Additional sheets may be included to support your statements below).

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

E. Does substitution affect Drawing dimensions?

Yes ___  No ___  If No, explain: _____________________________________________________________

F. What effect does substitution have on other trades?

Yes ___  No ___  If No, explain: _____________________________________________________________

G. Does manufacturer's warranty or proposed substitution differ from that specified?

Yes ___  No ___  If No, explain: _____________________________________________________________

H. Will substitution affect progress schedule?

Yes ___  No ___  If No, explain: _____________________________________________________________
I. Will substitution require more license fees or royalties than specified product?
Yes ___  No ___  If No, explain: ____________________________________________________

J. Will maintenance and service parts be locally available for substitutions?
Yes ___  No ___  If No, explain: ____________________________________________________

K. Does the manufacturer have an unresolved warranty issues with any previous District projects?
Yes ___  No ___  If No, explain: ____________________________________________________

Submitted By:

________________________________________  ______________________________________  
Signature  Printed Name  Date

________________________________________
Telephone  Email  Fax

For District Use Only:

________________________________________  ______________________________________  
Signature  Printed Name  Date

Accepted  Accepted as Noted Below

Rejected  Rejected as Noted Below

Remarks: ______________________________________________

____________________________________________________

____________________________________________________

____________________________________________________
**BID COVER SHEET**

Two (2) sealed copies of your bid, (1) original and (1) copy, must be submitted. The Vail Unified School District No. 20 will not assume responsibility for any costs related to the preparation or submission of the bid.

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Initial each Box when completed</th>
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<tbody>
<tr>
<td><strong>Bid Pricing Submittal</strong> – should include</td>
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<tr>
<td>• Guarantees of materials, warranty and workmanship</td>
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<tr>
<td>• Restatement of Work</td>
<td></td>
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<tr>
<td>• Scheduled based on Notice to Proceed through Substantial Completion on company letterhead</td>
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<tr>
<td>• Intent to Warranty – required for applied coating systems only</td>
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<tr>
<td><strong>Bid Bond</strong> – 10% of the Total Bid Project Cost</td>
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<tr>
<td><strong>Performance Bond</strong> – within 48 hours of award</td>
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<tr>
<td><strong>Payment Bond</strong> – within 48 hours of award</td>
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</tr>
<tr>
<td><strong>Subcontractor List</strong> – Should be completed and submitted in a separate envelope even if self-performing 100% of the work. Applied coating systems certification should be included, if applicable to any Subcontractors listed</td>
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<tr>
<td><strong>Asbestos Certification Form</strong> - Notarized</td>
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<tr>
<td><strong>Questionnaire</strong></td>
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<tr>
<td>• Company Profile Information</td>
<td></td>
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<tr>
<td>• References</td>
<td></td>
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<tr>
<td>• Copy of appropriate AZ Construction License(s)</td>
<td></td>
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<tr>
<td><strong>Offer and Acceptance</strong></td>
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<tr>
<td><strong>Confidential / Proprietary Statement</strong></td>
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<tr>
<td><strong>Conflict of Interest</strong></td>
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<tr>
<td><strong>Non-Collusion Statement</strong> - Notarized</td>
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<tr>
<td><strong>Deviations and Exceptions</strong></td>
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<tr>
<td><strong>Certification of Insurance</strong></td>
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<td><strong>Vendor Application</strong></td>
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<td><strong>I.R.S. W-9 Form</strong></td>
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<tr>
<td><strong>Bid Package Label</strong></td>
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The form of contract for any award made as a result of this bid will be a district purchase order referencing this bid. The amount will be based upon the fees shown in the bid, and will take into consideration previous and anticipated expenses for the forthcoming year. If your firm will require the District to sign an additional or separate contract, a copy of the proposed contract must be included with the bid.
**BID SUBMITTAL**

**Bid submittal of:**  
__________________________

(Firm’s Name)

**PROJECT:**  IFB 21-013-23: Vail Mechanic Shop Expansion

**TO:**  The Vail Unified School District No. 20 (Owner)

1. In compliance with the Invitation for Bid and Instructions to Offerors, the Offeror named above hereby offers to furnish the materials and perform the Work for the Owner's Project designated above in strict accordance with the Terms and Conditions, Specifications, Schedules, Drawings, all other pertinent Contract Documents, and Offeror’s own site verification of the project. The Offeror further agrees, upon written notice of acceptance of this Bid at any time within sixty (60) days after the date of opening of the bids, that Offeror will execute the Contract in accordance with the Bid as accepted, and give bond, as sufficient surety, in the amount of one hundred percent (100%) of the Contract Amount, within two (2) working days after a Notice of Award is presented for the following sums:

<table>
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<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>A. Base Bid:</td>
<td>$</td>
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<tr>
<td>B. Add Alternate: Replace Existing Light Fixtures</td>
<td>$</td>
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<tr>
<td>C. Add Alternate: New construction on Mezzanine</td>
<td>$</td>
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<tr>
<td>D. Miscellaneous “Unknown”: Items (B + C)</td>
<td>$</td>
</tr>
<tr>
<td>E. Total of A + D</td>
<td>$</td>
</tr>
<tr>
<td>F. Cost of Performance Bond</td>
<td>$</td>
</tr>
<tr>
<td>G. Prime Tax (If “E” is equal to or greater than $750,000)</td>
<td>$</td>
</tr>
</tbody>
</table>

(E + F + G) equals the **Total Bid Project Cost** $  

2. Enclosed is bid security as required consisting _______________ of in the amount of ($ _______________). (Not less than ten percent (10%) of the proposed Total Bid Project Cost, including all additive alternates.)

3. The Offeror hereby agrees that the above Base Bid includes a Cash Allowance of Zero and No/ I 00 ($0): If there are any funds remaining in the Cash Allowance after the Project has been fully completed, then upon final acceptance of the Project, the Contract Amount shall be reduced by the funds so remaining.

4. It is understood and agreed that the work under the Contract Documents shall be commenced by the Offeror, if awarded the Contract for the Project, on the date specified as the Start Date in the Notice to Proceed issued by the Owner in the manner specified in the Contract and General Conditions, and shall be completed by the Contractor by sunset, on the 180 days following the notice to proceed. If the Work is not completed by these dates, then the Offeror shall pay the Owner the amount of one hundred and No/100 Dollars ($100.00) per day as liquidated damages.

5. The Offeror offers the minimum workmanship warranty of 24 months: **YES ____ NO ___**

6. The Offeror understands that the Owner reserves the right to reject any or all Bids or to waive any formality or technicality, as determined by the Owner in its sole discretion, in any Bid in the interest of the Owner.
7. Provide a short Restatement of Work including product(s) being used to demonstrate understanding of the project:


8. The Offeror confirms a site visit and understands the conditions of the site, the full scope of the work, and related areas. YES ____ NO ____ If No, document that you will ask for no change orders as a result of not having made a site visit and thereby asking any questions that could have arisen.


9. Schedule based on Notice to Proceed through Substantial Completion: (Attached separately, if needed).


10. Are there any unresolved issues with your firm and the Register of Contractors? YES ____ NO ____
If Yes, explain:


BID BOND PURSUANT TO RULE R7-2-1102  
OF THE ARIZONA ADMINISTRATIVE CODE  
(SCHOOL DISTRICT PROCUREMENT RULES)  
(PENALTY OF THIS BOND MUST BE NOT LESS THAN 10% OF THE BID AMOUNT)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, ________________________________ (hereinafter called the "Principal"), as Principal, and ________________________________, a corporation organized and existing under the laws of the State of ________________, with its principal office in the City of ________________ (hereinafter called the Surety"), as Surety, are held and firmly bound unto Vail Unified School District No. 20 (hereinafter called the "Obligee") in the amount of _________________________ Dollars ($_____________), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for

NOW, THEREFORE, if the Obligee shall accept the proposal of the Principal and the Principal shall enter into a contract with the Obligee in accordance with the terms of the proposal and give the bonds and certificates of insurance as specified in the standard specifications with good and sufficient surety for the faithful performance of the contract and for the prompt payment of labor and materials furnished in the prosecution of the contract, or in the event of the failure of the Principal to enter into the contract and give the bonds and certificates of insurance, if the Principal pays the Obligee the difference not to exceed the penalty of the bond between the amount specified in the proposal and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by the proposal, then this obligation is void. Otherwise, it remains in full force and effect; provided, however, that this bond is executed pursuant to the provisions of Ariz. Admin. Code Rule R7-2-1102, and all liabilities on this bond shall be determined in accordance with the provisions of the section to the extent as if it were copied at length herein.

The prevailing party in a suit on this bond shall recover as a part of his judgment such reasonable attorneys' fees as may be fixed by a judge of the Court.

Witness our hands this _______ day of _________________, 2019.

----------------------------------------
PRINCIPAL

Seal

By_________________________________
AGENCY OF RECORD

Title ________________________________

Agency Address

----------------------------------------
SURETY

Seal

By_________________________________

Title ________________________________
PERFORMANCE BOND PURSUANT TO R7-2-1103
OF THE ARIZONA ADMINISTRATIVE CODE
(SCHOOL DISTRICT PROCUREMENT RULES)
(Penalty of this bond must be 100% of the Contract Amount)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, __________________________________________________________ (hereinafter called the "Principal"), as Principal, and ____________________________________________, a corporation organized and existing under the laws of the State of __________, with its principal office in the City of ______________________ (hereinafter called the "Surety"), as Surety, are held and firmly bound unto Vail Unified School District No. 20, Pima County, Arizona (hereinafter called the "Obligee"), for the amount of _____________________ Dollars ($____________________) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, entitled Contract and General Conditions Between Owner and Contractor, dated the ____ day of ________________, 2019 ("Contract"), to construct and complete certain work described as ____________________________________, which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the condition of this obligation is such that if the Principal faithfully performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of the Contract during the original term of the Contract and any extension of the Contract, with or without notice to the Surety, and during the life of any guaranty required under the Contract, and also performs and fulfills all of the undertakings, covenants, terms, conditions and agreements of all duly authorized modifications of the Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, the above obligation is void. Otherwise, it remains in full force and effect.

Provided, however, that this bond is executed pursuant to the provisions of Arizona Administrative Code Rule R7-2-1103, and all liabilities on this bond shall be determined in accordance with the provisions of said Rule, to the extent as if it were copied at length in this agreement.

The prevailing party in a suit on this bond shall recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the Court.

Witness our hands this ______ day of ________________, 2019.

____________________________________
PRINCIPAL
Seal

__________________________
By_________________________________
AGENCY OF RECORD
Title ___________________________________
Agency Address ________________________

SURETY
Seal

__________________________
By_________________________________
Title ___________________________________
PAYMENT BOND PURSUANT TO R7-2-1103
OF THE ARIZONA ADMINISTRATIVE CODE
(SCHOOL DISTRICT PROCUREMENT RULES)
(Penalty of this bond must be 100% of the Contract Amount)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, ________________________________________________________________________ (hereinafter called the "Principal"), as Principal, and ______________________________, a corporation organized and existing under the laws of the State of ____________, with its principal office in the City of ________________ (hereinafter called the "Surety"), as Surety, are held and firmly bound unto Vail Unified School District No. 20, Pima County, Arizona (hereinafter called the "Obligee"), for the amount of ________________ Dollars ($_________________) for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, entitled Contract and General Conditions Between Owner and Contractor, dated the ____ day of ________________, 2017 ("Contract"), to construct and complete certain work described as ________________________, which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the condition of this obligation is such that if the Principal promptly pays all monies due to all persons supplying labor or materials to the Principal or the Principal's subcontractors in the prosecution of the work provided for in the Contract, this obligation is void. Otherwise it remains in full force and effect.

Provided, however, that this bond is executed pursuant to the provisions of Arizona Administrative Code Rule R7-2-1103, and all liabilities on this bond shall be determined in accordance with the provisions, conditions and limitations of said Rule, to the extent as if it were copied at length in this agreement.

The prevailing party in a suit on this bond shall recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the Court.

Witness our hands this _______ day of _________________, 2019.

_____________________________________________________
PRINCIPAL

_____________________________________________________
AGENCY OF RECORD

_____________________________________________________
SURETY

IFB 21-013-23: Vail Mechanic Shop Expansion
SUBCONTRACTOR SUBMITTAL

This form shall be completed and submitted in a separate sealed envelope as a part of the bid submittal. The list is necessary even if Offeror plans to self-perform 100% the work.

PROJECT: IFB 21-013-23: Vail Mechanic Shop Expansion

In compliance with the Special Terms and Conditions to Offerors and in conformity with the Contract and General Conditions, the undersigned submits the following names of Subcontractors to be used in performing the work for the Project.

Note:
1. Successful Offeror must furnish to the Owner the Arizona contractor's license number for each listed Subcontractor. ONE, and only one, Subcontractor shall be submitted for each portion of the work. The failure to list a Subcontractor for work not performed by Contractor's own forces or the listing of more than one Subcontractor for each portion of the work shall be considered non-responsive, and shall be grounds for rejection of the bid by the Owner, at the Owner's sole discretion. The List of Subcontractors shall be based on the "Base Bid" scope of work. Offeror shall denote where it is intended to use their own forces.

2. Contractors using applied coating systems must include manufacturer/reputable distributor certification to apply in conjunction with "intent to Warranty".

<table>
<thead>
<tr>
<th>Subcontractor Work</th>
<th>Subcontractor Name</th>
<th>License #</th>
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Check here if no Subcontractors will be utilized for this project.

Name (Print)

Signature ______________________ Date ______________________

IFB 21-013-23: Vail Mechanic Shop Expansion 42
ASBESTOS CERTIFICATION STATEMENT

PROJECT: IFB 21-013-23: Vail Mechanic Shop Expansion

CONTRACTOR. The person, corporation or company who makes the accompanying Bid, having first been duly sworn, deposes and says: All materials to be used in the above referenced project are and shall be free of asbestos.

___________________________________________   _______________________________________
(Name)                                           (Title)

Subscribed and sworn to before me

this _________ day of__________ , 2019

Signature of Notary Public in and for the

State of __________________________________________

County of __________________________________________
QUESTIONNAIRE

A. Provide the name and address of the primary contact person and servicing office location:

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Title</td>
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<tr>
<td>Company Name</td>
<td></td>
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<tr>
<td>Physical Address</td>
<td></td>
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<tr>
<td>City, State and Zip</td>
<td></td>
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<tr>
<td>Main Number</td>
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<tr>
<td>Alternate or Cell Number</td>
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<tr>
<td>Email Address</td>
<td></td>
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<tr>
<td>AZ Construction License(s) ROC# (attach copies)</td>
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</tbody>
</table>

B. Contractor is licensed and registered in State of Arizona for at least 10 years. YES _____ NO _____

C. Contractor has a minimum of 15 full time employees. YES _____ NO _____

D. Contractor has provided a list of previous projects with experience. YES _____ NO _____

E. Does your firm obtain current valid fingerprint clearance cards from employees? YES _____ NO _____

F. Does your firm perform criminal background checks on employees? YES _____ NO _____

G. Does your firm conduct random drug screens for employees? YES _____ NO _____

H. Are there any pending reviews or litigation involving your firm in the past five years? YES _____ NO _____
   If Yes, attached explanation.

I. Have you had any complaints filed with the Better Business Bureau in the last five years? YES _____ NO _____
   If Yes, attached explanation and details how the complaints were resolved?

J. List three (3) Arizona References of similar projects:

<table>
<thead>
<tr>
<th>District/Owner</th>
<th>Contact</th>
<th>Phone</th>
<th>Email</th>
<th>Contract Term</th>
</tr>
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<tbody>
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<td>3.</td>
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</table>
OFFER AND ACCEPTANCE

Company Name: ____________________________________________

Arizona Transaction (Sales) Privilege Tax License Number: ________________________________

Federal Employer Identification Number: ___________________________ Tax Rate: ________________%

Phone: ___________________________ Fax: ___________________________

Printed Name: ___________________________ Title: ___________________________

E-Mail: ___________________________

Signature of Person Authorized to Sign Offer: ___________________________

CERTIFICATION

By signature in the Offer section above, the Offeror certifies:

1. The submission of the offer did not involve collusion or other anti-competitive practices.
2. The Offeror shall not discriminate against any employee or applicant for employment in violation of Federal Executive Order 11246, State Executive Order 75-5 or A.R.S. §§ 41-1461 through 1465 et. seq.
3. The Offeror has not given, offered to give, nor intends to give at any time hereafter any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a public servant in connection with the submitted offer. Failure to provide a valid signature affirming the stipulations required by this clause shall result in rejection of the offer. Signing the offer with a false statement shall void the offer, any resulting contract and may be subject to legal remedies provided by law.
4. The Offeror complies and maintains compliance with the Federal Immigration and Nationality Act (FINA), A.R.S. §41-4401 and §23-214 which requires compliance with federal immigration laws by State employers, State contractors and State subcontractors in accordance with E-Verify Employee Eligibility Verification Program.
5. In accordance with A.R.S. §35-391, the Offeror does not have scrutinized business operations in Sudan.
6. In accordance with A.R.S. §35-392, the Offeror is in compliance and shall remain in compliance with the Export Administration Act.
7. In accordance with A.R.S. §35-393, the Offeror does not have scrutinized business operations in Iran.
8. In accordance with A.R.S. §15-512, the Offeror shall comply with fingerprinting requirements unless otherwise exempted.
9. By submission of this bid, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
10. By submission of this bid, that no Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of a Federal contract, the making of a Federal grant, the making of a Federal loan, the entering into a Cooperative Agreement, and the extension, continuation, renewal, amendment, or modification of a Federal contract, grant, loan, or cooperative agreement.
11. In accordance with A.R.S. §§ 35-393, the Offeror is not currently engaged in, and agrees for the duration of the contract not to engage in, a boycott of Israel.

Contract Title: IFB 21-013-23: Vail Mechanic Shop Expansion

ACCEPTANCE OF OFFER

The Proposal is hereby accepted. The Contractor is now bound to sell the materials or services listed by the attached contract and based upon the solicitation, including all terms, conditions, specifications, amendments, etc., and the Contractor’s Proposal as accepted by the School District/Public Entity.

This contract shall henceforth be referred to as Contract No IFB 19-007-20. The Contractor is cautioned not to commence any billable work or to provide any material or service under this contract until Contractor receives a purchase order, contract release document, or written notice to proceed.

Awarded this______ day of ______________________ 20__

________________________________________
Michelle Quiroz, Director of Finance
CONFIDENTIAL/PROPRIETARY SUBMITTALS

Confidential/Proprietary Submittals (mark one):

_____ No confidential/proprietary materials have been included with this offer.

_____ Confidential/Proprietary materials included. Offerors should identify below any portion of their offer deemed confidential or proprietary (see Uniform General Terms and Conditions, paragraph 17).

Identification in this section does not guarantee that disclosure will be prevented but that the item will be subject to review by the Offeror and the District prior to any public disclosure. Requests to deem the entire offer or price as confidential will not be considered. The School District/Public Entity will not consider pricing to be confidential or proprietary.

_________________________________
Firm

_________________________________
Authorized Signature
CONFLICT OF INTEREST

The undersigned, the owner or authorized officer of ________________________________ (the "Firm"), Hereby represent and warrant to their best knowledge that no familial relationships exist between the owner(s) or any employee of the company and any member of the Governing Board of the Vail Unified School District, Superintendent of the Vail Unified School District, any employee of the Vail Unified School District, or any employee of Swaim Associates, Ltd. Architects AIA.

_____ YES  _____ NO  If NO, disclose relationship(s) below.

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

Name Print

Authorized Signature

Date

Offeror/Employee Name    Name of District Employee    Relationship
NON-COLLUSION AFFIDAVIT

State of )
 ) ss.
County of )

______________________________________________________________, affiant,
(Name)

the ____________________________________________________________, (Title)
(Contractor/Offeror)

The persons, corporation, or company who makes the accompanying bid, having first been duly sworn, deposes and says:

That such bid is genuine and not sham or collusive, nor made in the interest of, or behalf of, any persons not herein named, and that the Offeror has not directly or indirectly induces or solicited any other Offeror to put in a sham bid, or any other person, firm or corporation to refrain from bidding, and that the Offeror has not in any manner sought by collusion to secure for itself an advantage over any other Offeror.

______________________________________________________________

______________________________________________________________

(Title)

Subscribed and sworn to before me this ________ day of ________________, 20__.

______________________________________________________________
Signature of Notary Public in and

for the County of

_________________________ State of
_________________________
DEVIATIONS AND EXCEPTIONS

Offerors shall indicate any and all exceptions taken to the provisions or specifications in this solicitation document. Exceptions (mark one):

__________ No exceptions

__________ Exceptions taken (describe below – attach additional pages if needed)

___________________________________

Firm

___________________________________

Authorized Signature
CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 1/9/2014

Vail Unified School District No. 20

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER

My Brokerage

1 Broker Lane

Brokerageville CA 12345

CONTACT NAME

Mrs. Professional Broker

PHONE (818) 555-1212

FAX (818) 555-1234

E-MAIL ADDRESS msbroker@broker.age

INSURER 1

My Production Company

100 Maserati Avenue

INSURER 2

Exterior CA 12354

AFFORDING COVERAGE

INSR # 12301

REVISION NUMBER:

COVERAGE A

CLAIMS MADE CLAIMS OCCUR

LIMITS

GENERAL LIABILITY

A

COMMERCIAL GENERAL LIABILITY

POLICY NUMBER 55533322

POLICY EFFECTIVITY

1/8/2014 1/8/2015

PROMISES (Each occurrence)

$1,000,000 Included

EXCLUSIONS AND CONDITIONS OF SUCH POLICY

MED EXP (Any one person) $10,000

PERSONAL & ADV INJURY $1,000,000

GENERAL AGGREGATE $2,000,000

PRODUCTS - COMPOP AGG $1,000,000 Included

TOTALS

$1,000,000

AUTO LIABILITY

B

ANY AUTO

$75,000 ACV

COMP DED $1,000

COLL DED $1,000

Hired Auto Phys Dmg Limit

$75,000 ACV

$1,000,000

PROPERTY DAMAGE (Per accident) $500

PERSONAL & ADV INJURY (Per person) $500

COMBINED SINGLE LIMIT (Per accident) $1,000,000

EXCLUSIONS AND CONDITIONS OF SUCH POLICY

UMBRELLA LIABILITY

C

EXCESS OCCUR CLAIMS MADE

DED RETENTION

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Certificate holder is included as Additional Insured for Liability but only as respects to claims arising out of the negligence of the Named Insured. Certificate holder is named as Loss Payee as respects rented/leased equipment &/or vehicles.

CERTIFICATE HOLDER

Digital Film Studios LLC

11800 Sheldon Street, Unit B/C/D

Sun Valley, CA 91352

CANCELATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Broker Name

Sample Only - Not Valid

COPY

Not Valid

IFB 21-013-23: Vail Mechanic Shop Expansion
# VENDOR APPLICATION

Please provide all information that applies.

Submit this form with a signed copy of your W9.

The vendor is responsible to contact VUSD with any updates or changes. Questions? Contact Purchasing Analyst, Tori Gamble at (928) 879-2028.

## COMPLETE AND RETURN TO:
purchasing@vailschooldistrict.org
Vail Unified School District No. 20
Purchasing Department
13801 E Benson Highway
Vail, AZ 85641

### VENDOR DISCLOSURES:
(Required)
- Yes* □ No Are you an employee for VUSD.
- Yes* □ No Are you a relative of a VUSD employee? If yes, who?
  *If yes answered to either question above a conflict of interest form must be on file.

#### Name of Business:

#### DBA (if applicable):

#### Address:

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
</table>

#### Main Business Phone #:

#### Website:

#### Federal Tax ID or SSN #:

#### DUNS No.:

#### Tax Classification:
- Corporation
- LLC (C)
- LLC (S)
- LLC (P)
- Non-Profit

### PURCHASE ORDER INFORMATION

- Does Your Organization Accept Purchase Orders: Yes* □ No
  *By indicating Yes, vendor agrees to Net 30 terms and understands payment will not be issued until services/goods are received, and an invoice is provided to the VUSD Accounts Payable Department.

#### Business Name on Purchase Orders:

#### Address on Purchase Order:

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
</table>

#### Vendor Order Phone #:

#### Vendor Order Email:

### PAYMENT AND INVOICE INFORMATION

- Pay to the Order of:

#### Remittance Address:

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
</table>

#### Accounting Contact:

#### Accounting Phone:

#### Accounting Email:

### USE TAX DETERMINATION

- Do you have an Arizona Transaction Privilege Tax License? Yes □ No
  (If Yes, #: )

- Does your organization have a physical Arizona Location? Yes □ No

- Does your organization provide goods, services, or both? Goods □ Services □ Both

### COOPERATIVE PURCHASING:

(Check all that apply and indicate award number for each contract)

- Mohave #
- City of Tucson #
- S.A.V.E. #
- NJPA #
- State of Arizona #
- US Communities #
- National IPA #
- NCPA #
- GPA #
- Partners Choice #
- Other #
SEALED BID

Do not open this package until the due date and time listed below

Submitted by:
Company Name:
Address:
City, State, Zip:

Deliver To:
Vail Unified School District No. 20
Attn: Purchasing Department / Tori Gamble
13801 E. Benson Hwy. Suite B
Vail, AZ 85641

IFB 21-013-23 Vail Mechanic Shop Expansion
Opening Date: March 08, 2021 at 2:00 p.m. Local AZ Time*

*bids received after this date and time will not be opened
DIVISION 1 - GENERAL REQUIREMENTS

010100 – COMPLETION OF WORK AND SPECIAL PROVISIONS

The Contractor shall provide and pay for all materials, labor services, tools, and other items necessary to complete the Project as specified and shown on the drawings. All materials shall be new, and both workmanship and materials shall be of good quality. All workmen and subcontractors shall be skilled in their trades. The Contractor shall be responsible for safe, proper, and lawful construction and shall construct in the best and most workmanlike manner a complete project reasonably implied. The Contractor shall protect the work and be responsible for any damage or injury due to his act or neglect. The Contractor shall keep the premises free from accumulation of waste materials at all times. Measurements must be taken on the job before erection or fabrication. Extra compensation will not be allowed because of differences between job and drawings that have not been brought to the attention of the Architect in writing before starting the work. Mention in the specifications or indication on the drawings of articles, materials, operations, or methods requires that the Contractor provide each item mentioned, perform each operation and provide all necessary labor, equipment, and incidental materials.

1. PROJECT SCHEDULE:

The project shall be completed as follows:

A. Construction: From the Notice to Proceed to Substantial Completion the Project shall be completed in 180 days.

2. GENERAL NOTES:

A. The Bus Maintenance building and site shall remain in operation during construction. The existing wall between the new and existing shall remain in place as long as possible, and a secure temporary barrier is required once removed until the building is enclosed. 48 hour notice is required prior to any utility disruptions.

B. Smoking and all other tobacco products are not allowed on site.

C. Before the project will be classified as “final completion,” the Contractor will develop and complete a punch list. The Owner and Architect will determine when the project meets “final completion.” A punch list must be established and completed within the project calendar day time frame.

END OF SECTION
010300  ADDITIVE ALTERNATES

This section identifies each Alternate and describes basic changes to the Work only when that Alternate is made a part of the Work by specific provision in the Agreement.

A. The scope of Work for all Alternates shall be in accordance with applicable Drawings and Specifications.

B. Each Alternate is intended to cover all of the work required for a complete finished job.

C. Coordinate related Work and modify surrounding Work as required to properly and completely integrate the Alternates into the Work.

D. The Base Bid and the Alternates are exclusive in their scope of work. There is no overlap between or among the Base Bid and Alternates. The cost of any item of work shall be included only once, in the Base Bid or in the Alternates.

The Contractor shall include in his proposal the costs to accomplish each of the following described items of work:

A. Replace existing light fixtures.

B. New construction on mezzanine.

END OF SECTION

010400  SUPERINTENDENCE

The Contractor shall keep on his work a competent superintendent satisfactory to Architect. The superintendent shall not be changed except with the consent of the Architect, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case.

END OF SECTION

010410  WORK BY OTHERS

The following work shall be furnished and installed by others under separate contract with the Owner. Contractor shall allow access to the site and adequate space for storage of materials and equipment, cooperate and coordinate with Owner.
to accommodate the work within the specified time period. Responsibility for related work under this contract is noted. Where facilities are to be provided for rough-in only, under this contract, he shall verify requirements before proceeding with the work. Such items are as follows:

A. Furnishings  
B. Equipment  
C. Shelving

END OF SECTION

010430 CLAIMS FOR EXTRA COST

If the Contractor claims that any instructions by drawings or otherwise involve extra cost under this contract, he shall give the Architect written notice thereof after the receipt of such instructions and in any event before executing the work. Submit a detailed cost breakdown with quantities and unit prices. No such claim will be valid unless so made. Cost of extra work shall be established and approved by the Architect before executing the work.

END OF SECTION

010950 REFERENCES

References to standard specifications and codes shall mean latest published edition at date of contract.

END OF SECTION

010960 CONTRACT DOCUMENT CLARIFICATIONS

Prior to commencing work, Contractor shall carefully examine the drawings, visit the site of work, and fully inform himself of all existing conditions and limitations excepting in underground and inaccessible locations. Should the Contractor, at any time during the course of this project, become aware of any inconsistencies, errors, omissions, or conflicts in drawings, specifications, codes, ordinances, or existing conditions, he shall notify the Architect in writing to request clarification direction. In the event of failure to so notify the Architect, the Contractor shall correct any deficiencies resulting therefrom as directed by the Architect at no extra cost.

END OF SECTION
010970 WORKMANSHIP

If, in Contractor’s opinion, any work is shown on drawings or specifications in such a manner to make it impossible to produce a high caliber of workmanship, such conditions shall be referred to Architect for clarification. Failure to notify Architect of such conditions and proceeding with work shall be cause for rejection of work and must be reworked or reinstalled in acceptable manner at no extra cost to Owner. Should conflict occur between drawings and specifications, Contractor shall be deemed to have estimated the more expensive way, unless certified in writing by Architect. Cutting or repairing work in place necessary because of progress of work or negligence of Contractor shall be paid for by the Contractor responsible for the work in progress or the negligence.

END OF SECTION

010980 PERMITS

1. Building permits are not required. Utility connection fees shall be paid for by the Owner. All other permits shall be paid for by the Contractor.

2. Building Code Inspections shall be by the Architect and Engineers of record.

3. Special Inspections shall be paid for by the Owner.

END OF SECTION

011000 REGULATIONS AND STANDARDS

1. Conform to all codes and regulations having jurisdiction over this project, including International Building Code, local codes, and applicable mechanical and electrical codes.

   A. Regulations: Comply with requirements of local laws and regulations covering construction and local industry standards, in the installation and maintenance of temporary services and facilities including but not limited to, the following:

      (1) Building codes, including local requirements for permits, testing, and inspection.

      (2) Health and safety regulations.

      (3) Utility company regulations and recommendations governing temporary utility services.

      (4) Police and Fire Department rules and recommendations.

      (5) Police and Rescue Squad recommendations.
Environmental protection regulations governing use of water and energy, and the control of dust, noise, and other
nuisances.

B. Standards:


2. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", as prepared jointly by AGC and ASC for industry recommendations.

END OF SECTION

01100 DEFINITIONS

"Or (approved) equal" shall mean approved as an equal in opinion of Architect prior to bid. "Approved" shall mean approved in writing by Architect. "As required" shall mean as required by competent construction practices. "As acceptable" shall mean acceptable by Architect. "As recommended" shall mean as recommended by Manufacturer.

END OF SECTION

011200 CONTRACTOR'S LICENSE LAW

Contractor shall comply with, and require all subcontractors to comply with, State and City Contractor's License Law and to be duly registered and licensed thereunder.

END OF SECTION

011300 SPECIFICATION HEADINGS

For convenience of reference, these specifications are separated into titled divisions. Such separations shall not operate to make the Architect or Owner an arbitrator to establish limits to the contracts between Contractor and subcontractors.

END OF SECTION

01300 SHOP DRAWINGS AND SAMPLES

Contractor shall supply the Architect with a schedule of all shop drawings to be

DIVISION 1 GENERAL REQUIREMENTS
submitted. Submit samples where required. Approved sample shall constitute example of work expected of entire project. All submissions are through General Contractor and shall be stamped, reviewed, and approved by the Contractor prior to submitting to the Architect. The Contractor shall not proceed with work until submittals are approved.

Review is for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or departure therefrom. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of construction and assembly, for coordination of his work and that of all other trades, and for performing his work in a safe and satisfactory manner.

1. Shop Drawings:
   A. Submit one (1) electronic copy for annotation and correction by Architect.
   B. All submittals shall have an 8.5” x 11” cover sheet indicating the type of submittal and project name. The remainder of the sheet shall be reserved for approval stamps from Contractor, Architect, and Consultants.

2. Materials List and Literature:
   A. Manufacturer’s literature and materials’ lists shall be submitted electronically. All color selection information shall be submitted in hard copy form or with actual samples for review.
   B. Manufacturer’s literature shall be labeled to indicate the name of the project, manufacturer, brand or other identification where required. In addition, catalogues shall be marked to indicate the specific items submitted for approval.
   C. The right is reserved to require submission of samples of any material, and any materials’ lists, whether or not specifically mentioned herein.

END OF SECTION

013310 COST BREAKDOWN AND PROGRESS SCHEDULE

After construction contract is awarded, Contractor shall provide a breakdown of his costs into categories, and an estimated schedule of progress in graph form. The schedule shall be updated monthly.
PRIOR APPROVAL REQUESTS

All prior approval requests must include documentation which clearly indicates the differences in specification between the requested prior approval and the base specification. A sample manufacturer's warranty and a product sample is required where applicable. All prior approval requests must be received by the Architect with the time limits prescribed in the instructions to bidders. Requests received after that time will not be considered.

TEMPORARY FACILITIES

The Contractor shall provide temporary field office, telephone, and restroom facilities. Connections for temporary power and water shall be by the contractor. Power and water shall be paid for by the Owner.

SITE PROTECTION

No existing trees or other vegetation shall be removed, trimmed, or damaged without approval of the Architect. Vegetation located in the vicinity of construction shall be tagged, fenced off, and/or tied back for protection. Portions of the site not affected by new construction shall remain undisturbed.

TEMPORARY ENCLOSURES, BARRIERS AND FENCES

1. Provide and maintain all fences, barricades, lights, shoring and other protective structures or devices necessary for the safety of workmen, equipment, the public, and property as required by state or municipal laws and regulations, local ordinances, laws, and other requirements of the county, state, and other authorities having jurisdiction with regard to safety precautions, operation, and fires hazards.

2. Provide 6 foot high woven wire temporary fencing around the construction area. Fencing shall be erected and secured in a manner to withstand the forces to which it may be subjected. Locate gates for access to the areas as required. Close and lock all gates after normal working hours. Barbed wire is not permitted on fencing.

3. Protect all elements of construction from any danger of damage from wind,
rain, dust, frost, freezing temperatures, or other infiltration of weather.

END OF SECTION

015200 SECURITY

The Architect and the Owner do not assume any responsibility, at any time, for the protection of construction areas and premises, or for loss of materials, from the time that the contract operations have commenced until the final acceptance of the work by the Architect and Owner. If watchman service is deemed necessary by the Contractor, such protection shall be provided and paid for by the Contractor.

END OF SECTION

015250 NOISE AND DUST CONTROL

Exercise all possible care to control excessive noise and dust during the construction to keep these problems to a minimum. Traffic or construction areas shall be sprinkled with water or chemicals as required and in accordance with applicable County requirements. The contractor shall pay for and provide all water necessary to minimize dust during the project.

END OF SECTION

016000 MATERIALS

Each Contractor is responsible for proper care of his materials and equipment until date of acceptance of work. Materials damaged or destroyed shall be removed and replaced with new materials. All materials shall be new unless noted otherwise. Installation of materials over sub-surface will be considered as acceptance of sub-surface by materials applicator.

END OF SECTION

017700 PROJECT CLOSEOUT

1. General:

   A. Related Documents:

      (1) Drawings and general provisions of Contract, including General Conditions and other Division-1 Specification Sections, apply to this Section.

2. Summary:
A. This section specifies administrative and procedural requirements for project closeout including, but not limited to, the following:
   - Review procedures
   - Project record document submittal
   - Operating and maintenance manual submittal
   - Submittal of warranties
   - Final cleaning

3. Substantial Completion:

   A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in request.

   (1) In the Application for Payment that coincides with, or follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and as statement showing an accounting of changes to the Contract Sum.

   (2) If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

   (3) Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.

   (4) Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.

   (5) Deliver extra stock and similar items.

   (6) Complete final clean-up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

   (7) The Owner's Representative will repeat review when requested and assure that the Work has been substantially completed.

   (8) Results of the completed review will form the basis of requirements for final acceptance.

4. Final Acceptance
A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

(1) Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

(2) Submit an updated final statement, accounting for final additional changes to the Contract Sum.

(3) Submit consent of surety to final payment.

B. Re-inspection Procedure: The Owner’s Representative will again review the Work upon receipt of notice that the Work, including review list items from earlier reviews, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Owner’s Representative.

5. Record Document Submittals

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistant location; provide access to record documents for the Owner’s Representative’s reference during normal working hours.

B. Record Drawings: Maintain a clean, 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 whichever 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.

Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.

Note related Change Order numbers where applicable.

Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other
identification on the cover of each set.

If digital copies of record drawings in PDF format are used, provide one (1) hard copy set to Owner as well as three (3) digital copies.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options, and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.

Upon completion of the Work, submit record Specifications to the Owner’s Representative for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer’s installation instructions and recommendations. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

E. Maintenance Manuals: Provide three (3) hard copies and two (2) electronic copies of all O&M Manuals for equipment and products installed during the construction or remodeling project. Organize operating and maintenance data into suitable sets of manageable size. All of the close out documents are to be placed in a white three ring binder which has a see-through front panel and binding edge that allows a sheet to be installed as a title sheet.

All information shall be installed in a proper indexed individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Table of Contents is to be typed and installed.

All notebooks are to have divisions for each of the categories as listed below. Include the following types of information.

(1) Provide a copy of all maintenance parts and supplies required
to maintain building operations for a year or through normal maintenance cycle. Examples would be filters, lamp schedule, etc.

(2) Provide copies of all shop drawings and product Cut Sheets for all brand names of major items used on the project, such as light fixtures, electrical switch gear, HVAC units, fans, coils, etc.

(3) Provide all Letters of Warranty for installation and project.

(4) Provide a listing of all Sub-Contractors performing work on the project and their responsibility during the project.

(5) Provide any and all Regulatory Documents, i.e., permits, air inspections, waste manifest, etc. that applies to the project, or were part of the project during the construction or remodeling phases, that are required by Federal, State, Local Code, and/or Regulatory Agencies.

(6) Provide a copy of Record Drawings for project.

6. Closeout Procedures

A. Final Cleaning:

(1) General: General cleaning during construction is required.

(2) Cleaning: Clean the site, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.

(3) Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION
017710 CLEAN-UP

The job site work area shall be clean and orderly at all times. Upon completion, leave work in clean condition. Each subcontractor responsible for removal of debris caused by his work. Contractor shall do the following cleaning:

1. Clean all tire marks off of sidewalks and concrete paving in project area.
2. Glass: Remove putty, stains, etc. and wash and polish all glass, both sides.
3. Painted, Decorated, and Stained Work: Remove all marks, stains, fingerprints, and other soil and dirt. Touch-up as required.
4. Hardware and Metal Surfaces: Clean all hardware and metal surfaces.
5. Tile and plumbing fixtures: Clean and polish; seal tile grout.
6. Clean all finger prints off finished surfaces – walls, ceilings, millwork, etc.
7. Carpet: Vacuum and remove any spots.
8. Concrete floors: Clean and polish.

END OF SECTION

017720 ADDITIONAL MATERIALS FOR OWNER MAINTENANCE

Upon completion of the project, the Contractor shall furnish the Owner with containers of each of the following items of material of each color or type used in the job:

1. Paints and stains: 1 unopened gallon, each color.
2. Rubber base: 50 linear feet, each color.
3. Acoustic Ceiling Tiles: 1 box.

The above materials shall not be utilized by the Contractor for repairs or replacement prior to final acceptance of the project by the Owner.

END OF SECTION

017740 GUARANTEE

Contractor shall guarantee his work for a period of two years, or a longer period when so specified, from date of final acceptance. Should defects develop within guarantee period due to faults in materials and/or workmanship, Contractor shall make all repairs and do all necessary work to Architect's satisfaction without cost to Owner within ten days after notice to Contractor. If Contractor fails to do work so ordered, Owner may have work done and charge cost thereof against monies retained and, if said monies shall be insufficient to pay such cost or money
available, Contractor and his sureties agree to pay Owner for such work. Nothing herein intends or implies that guarantee shall apply to work which has been abused or neglected by the Owner.

END OF SECTION
END OF DIVISION
1. GENERAL:

A. Description of Work

(1) Work as evident on drawings and specified herein or required for furnishing all labor, materials, equipment and services necessary for installation of formwork, complete in conjunction with Section 033000 Cast-In-Place Concrete.

B. Related Work

(1) Section 032000 Concrete Reinforcing Steel
(2) Section 033000 Cast-In-Place Concrete.

C. Standards

(1) Formwork shall conform to the latest edition of the following standards and to the drawings and specifications:

   a. ACI 347 American Concrete Institute - Recommended Practice for Concrete Formwork.
   b. ACI SP-40 American Concrete Institute - Formwork for Concrete
   c. ASTM American Society for Testing and Materials Standards.

D. Formwork Design

(1) The Contractor shall assume all responsibility for the safety of the formwork and shall provide all necessary design, construction, materials, and maintenance to produce the required concrete work safely. Design all formwork to have sufficient camber to maintain the tolerances specified. Strength shall be sufficient to compensate for the weight of the fresh concrete and a construction live load of 50 psf minimum.

2. PRODUCTS:

A. Form Facing Materials

(1) Concrete surfaces to be left exposed at completion of work: PLYFORM Class I or II B-B EXT-DFPA conforming to the U.S. Product Standard PS I for Softwood Plywood.
(2) Concrete surfaces to be left unexposed at completion of work: Plywood or boards capable of producing finished surfaces that are reasonably true to line and plan.

B. Form Ties

(1) Continuous single member and internal disconnecting.

C. Form Release Agent

(1) Nonstaining, free from lubricating, conventional form and diesel oils, or kerosene; a chemically active form release agent that will not impair bonding of plaster, paint or cement coatings to concrete surfaces.

D. Metal Dovetail Anchor Slots

(1) Machine fabricated from at least 24 gage steel hot-dip galvanized slot completely filled with removable filler, standard size, and lengths as required by work.

3. EXECUTION:

A. Forms

(1) For plywood formed surfaces to be left exposed at the completion of the work, use 5/8" or thicker plywood with joints true, level and taped or caulked to prevent leakage of cement paste, and locate form ties level and plumb in horizontal rows and vertical tiers.

(2) Concrete surfaces that will remain exposed at completion of the work shall be formed as specified, as shown on Drawings, and in such a manner that the exposed surfaces require a minimum of reworking to be acceptable to the Architect. Forms shall be sufficiently tight to prevent leakage of cement paste. Flashes of concrete that occur between abutting edges of plywood forms shall be removed.

(3) Allowable Tolerances: In accordance with requirements of ACI 347, paragraph 3.3.1; mass concrete in accordance with ACI 347, Paragraph 3.3.
B. Accessories

(1) Install accurately and firmly in forms all inserts and embedded items as shown on Drawings, as required to support or fasten the work of other trades, as provided and located by other trades, and as necessary to complete the work. Secure them against displacement during concreting.

C. Anchors

(1) Install metal dovetail anchor slots vertically in forms, where masonry is not tied to concrete by reinforcing bars, as shown on Drawings.

D. Removal of Forms

(1) Forms shall be removed only with the approval of Architect and in a manner to insure complete safety of the structure. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to support safely their weight and the load thereon. The results of suitable control tests may be used as evidence that the concrete has attained such sufficient strength.

END OF SECTION
032000 CONCRETE REINFORCING STEEL

1. GENERAL:

   A. Description of Work

      (1) Work as evident on the drawings and specified herein or required
          for furnishing all labor, materials, equipment, and services
          necessary for the installation of reinforcement complete, in
          conjunction with Section 033000 Cast-In-Place Concrete.

   B. Related Work

      (1) Section 033000: Cast-In-Place Concrete.

      (2) Drawings: General Structural Notes.

   C. Submittals

      (1) Certificate: Mill certificate of compliance shall be provided for all
          reinforcing steel.

      (2) Shop Drawings: Furnish shop drawings in accordance with Section
          013300 Shop Drawings and Samples showing all reinforcing steel
          bending and assembly diagrams, splicing, laps or rods, shapes,
          dimensions and details. Shop drawings shall be approved before
          fabrications.

          a. In reviewing shop drawings, the Architect / Engineer will
             attempt to detect omissions and major errors, but neither
             failure of the Architect / Engineer to do this nor the review
             of the shop drawings shall relieve the Contractor of their
             responsibility to comply with the Drawings and
             Specifications.

   D. Standards

      (1) Detailing, fabrication and placing of all reinforcing steel shall
          conform to the latest edition of the following standards and to the
          Drawings and Specifications.

          a. IBC International Building Code, Chapter 21, Masonry; and
             Chapter 19 Concrete.

          b. ACI 315 American Concrete Institute-Manual of Standard
             Practice for Detailing Reinforced Concrete Structures.
c. ACI 318 American Concrete Institute-Building Code Requirements for Reinforced Concrete.
d. ICBO Research Recommendation Report
e. ASTM American Society for Testing and Materials Standards, latest editions.

2. PRODUCTS:

A. Reinforcement

(1) Reinforcing Steel: ASTM A615 with supplement (SI), marked "S" and as follows: Grade 40 for Numbers 3 thru 4; Grade 60 for Numbers 5 thru 18.

(2) Tie Wire: ASTM A82, 18 gage black annealed wire.

(3) Dowel Bar Splicers and Dowel-Ins: As manufactured by the Richmond Screw Anchor Co., or approved equal, with a minimum rated tensile capacity of 150% of the yield strength for grade 60 steel. Dowel-ins shall have enlarged ends so that the cross-sectional area of bar is not reduced for threading.

B. Accessories

(1) Spacers, ties, chairs and other devices as required for placing spacing, supporting and fastening reinforcement.

3. EXECUTION:

A. Accessories

(1) Contractor shall supply all necessary wiring, chairs, bolsters, supports, and support bars, to put the reinforcement in place, fasten it securely, and keep it in place while concrete is being poured. Spacers, chairs, ties, and other accessories conforming to the American Concrete Institute Standards shall be furnished and installed to hold the bars in position. Chairs in sufficient number to prevent sagging and to support any pedestrian traffic during construction shall be used, but in no case less than that shown in the "Standard Number and Location of Accessories" in ACI 315.

B. Placement

(1) Metal reinforcement shall be free from scale, rust and other coatings which destroy bond. Metal reinforcement shall not be straightened or re-bent in a manner which will injure the material.
Bars with kinks or bends not shown on the plans shall not be used.

(2) On any vertical construction joint in the work where horizontal bars extend beyond the construction joint, the forms or head against which the work ends shall be perforated at the proper places to allow the bars to project through.

(3) Unless otherwise indicated on the plans, reinforcement shall be so placed as to provide a protective concrete covering in accordance with ACI 318. The bars shall be cut and bent as required and wired together. All bending shall be accurately done, as shown on the plans and by methods and appliances approved by the Architect. Adjoining bars and splices shall be per drawings but not less than at least 36 diameters in concrete, 48 diameters in masonry, and not less than 2'-0".

(4) Splices and laps shall be in accordance with plans. Necessary splices not shown on the Drawings shall be lapped sufficiently to develop the strength of the bar by bond and securely wired location shall be approved by the Architect.

(5) The clear distance between reinforcing bars shall not be less than 1-1/3 times the maximum size of coarse aggregate or 1 inch absolute minimum.

(6) All horizontal reinforcing in concrete shall be continuous around corners or corner bars shall be provided. Where bars of different sizes intersect at corners, corner bars of the larger size shall be provided.

END OF SECTION
033000 CAST-IN-PLACE CONCRETE

1. GENERAL:

A. Description of Work

(1) Work as evident on the Drawings and specified herein or required for furnishing all labor, materials, equipment, and services necessary to complete all cast-in-place concrete work.

B. Related Work

(1) Drawings: General Structural Notes

(2) Section 031000: Concrete Formwork

(3) Section 032000: Concrete Reinforcing Steel

C. Submittals

(1) Certificates: Cement will be accepted on the basis of the manufacturer's certification of compliance, accompanied by mill test reports, that cement meets the physical and chemical requirements of the specification under which furnished.

(2) Mix Design: Concrete mix design.

D. Standards

(1) Concrete work shall conform to the latest edition of the following Standards and to the Drawings and Specifications for the construction of Concrete Work:

a. IBC International Building Code, Chapter 19, Concrete.

b. ICBO Research Recommendation Report.

c. ACI 318 American Concrete Institute – Building Code Requirements for Reinforced Concrete.

d. ASTM American Society for Testing and Materials Standards.

E. Quality Control - Field Tests of Concrete

(1) All quality control testing during construction, if required by the Architect or Engineer, shall be paid for by the Owner and accomplished by the Geotechnical Laboratory of record that prepared the original report. In the event any retesting is required
due to the failure of materials to meet specifications limits, the Contractor shall pay for all such retesting.

(2) Compressive Strength Tests: ASTM C39; one set of samples of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete, not less than once for each 5,000 square feet of surface area for slabs or walls; one sample tested at 7 days, two samples tested at 28 days. Additional samples for early strength or 56 day testing shall be paid for by the Contractor. Testing of mixes shall be paid for by the Owner and accomplished by an accredited testing laboratory approved by the Architect.

(3) When tests of laboratory cured cylinders fail to meet specified requirements, the Contractor shall change proportions of water-cement ratio to increase the strength to the specified value, as directed by the testing laboratory.

(4) If any strength test of laboratory-cured cylinders falls below required $f'_{c}$ by more than 300 psi, if there is evidence that quality of concrete is below specification requirements, or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken by the Contractor to assure that load-carrying capacity of the structure is not jeopardized.

   a. When load tests indicate that concrete does not meet specifications, measures as prescribed by the Architect shall be taken by the Contractor to correct the deficiency at no additional expense to the Owner.

F. Embedded Items

   (1) Full cooperation shall be given other trades to install embedded items. Suitable templates or instructions, or both, will be provided for setting items placed in the forms. Embedded items shall have been completed and approved before concrete is placed.

2. PRODUCTS:

   A. Cement

      (1) Portland Cement Type II, conforming to ASTM C150 and shall be properly protected from weather.

   B. Aggregate
(1) Sand (fine aggregate) shall be hard, clean, screened, and washed sand. Gravel (coarse aggregate) shall be sound, clean, and durable particles and graded between the limits for size No. 57. Aggregates shall be free from clay, loam, organic or foreign substances, and shall conform to the requirements of ASTM C33.

C. Water

(1) Clean, fresh and free from harmful acids, alkalis, oils, and organic substances.

D. Expansion Joint Filler

(1) Resin impregnated fiberboard conforming to physical requirements of ASTM D1752, 1/2-inch unless otherwise indicated.

OR

(2) Sponge rubber, preformed, nonextruding, cement gray color; ASTM D1752, Type 1; 1/2-inch thick unless otherwise indicated.

E. Membrane-Forming Curing Compound

(1) Products complying with ASTM C309, Type I include the following:

a. Burke "Res-X Clear Resin Base: Or equal at floor surfaces to receive paint, resilient floor covering, or other bonded finish to slab.

b. Burke "Cure Clear Wax Base" or equal at floor surfaces to receive natural concrete finish.

(2) Apply curing compounds in accordance with manufacturer's instructions.

F. Admixtures

(1) Subject to prior approval by the Architect. The admixtures shall be shown capable of maintaining the same composition and performance throughout the work as the product used in establishing concrete proportions in accordance with ACI 318, Section 5. Calcium chloride or any admixture containing chloride ions shall not be used. Fly Ash shall not be allowed in mortar or grout. Fly Ash for concrete shall be Class F conforming to ASTM C618 and shall not replace more than 20% cement by weight.

G. Concrete Water Admixture
Interior concrete floor slabs and second floor south exterior deck shall have one of the following waterproofing admixtures or an approved equal

(1) AConcure@ by Concure Corporation (1-800-925-7746)
(2) ADarapel@ by W.R. Graw & Co. (1-602-233-12976)
(3) ARheomix 235” by Master Builders Technologies (1-800-628-9990)

H. Chemical Hardener

(1) Colorless aqueous solution containing a blend of magnesium fluosilicate combined with a wetting agent, containing not less than two pounds of fluosilicates per gallon.

I. Moisture-Retaining Cover

(1) One of the following, complying with ASTM C171:
   a. Waterproof paper.
   b. Polyethylene film CS 238 at least 6 mils thick.
   c. Polyethylene-coated burlap.

J. Non-Slip Abrasive Aggregate

(1) Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 40% aluminum oxide and not less than 25% ferric oxide. Use material that is factory-graded, packaged, rust-proof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.

K. Grout-Non-Shrink, Non-Metallic

(1) Grout for column and beam bearings, "Five Star Grout" as manufactured by U.S. Grout Corp., Old Greenwich, Conn.

L. Drill-In Expansion Anchors

(1) The anchors shall be a non-drilling type per the general structural notes. Anchors require Special Inspection by Testing Laboratory.

M. Non-Structural Fill Concrete

(1) Fill Concrete used behind retaining walls shall be 1,000 psi at 28 days, with 8" slump and ½" maximum aggregate.

3. EXECUTION:

033000 CAST-IN-PLACE CONCRETE
A. Concrete Design

(1) Design mixes shall develop the compressive strength within 28 days as indicated on the drawings for the various uses indicated.

(2) Concrete shall be of the specified quality capable of being placed without excessive segregation and, when hardened, of developing all characteristics required by Specifications.

(3) The proportions of ingredients for concrete shall be selected in accordance with ACI 318, Sections 5.2, 5.3, and 5.4, to produce the proper placeability, durability, strength and other required properties. However, total water content, including free moisture in the aggregate and all liquid admixtures shall not exceed 40 gallons per cubic yard, or as specified in the General Structural Notes, whichever is more restrictive.

(4) Limit slump as indicated on the drawings.

(5) All concrete shall be mechanically mixed until uniformly distributed. Each batch shall be mixed at least one minute after all the materials are in the mixer, and the mixer must be completely discharged before recharging. No ready-mix concrete shall be used which has been in the truck more than 90 minutes (60 minutes if air temperature exceeds 85 degrees) from the batch plant. All ready-mix concrete shall be prepared in conformance with ASTM C94

B. Joints

(1) Construction Joints in Structural Members: Location and detail of all construction joints in structural members, including structural slabs, piers, walls, grade beams, and footings shall be subject to the approval of the Engineer of Record.

(2) Joints in Slabs on Grade: Install contraction, construction, and expansion joints as shown in slabs on grade.

a. Provide one layer 30 pound felt at all locations where interior slabs on grade abut a vertical surface, and 1/2 inch preformed joint filler where exterior slabs as shown in slabs on grade.

b. Control (contraction) joints in slabs shall be located as detailed on the plans.

c. Joints in exterior concrete walks, slabs, etc., shall be placed as follows except as otherwise noted:
1) Expansion Joint - 15'-0" o.c. each way.
2) Cut Joints or Contraction Joints - 5'-0" o.c. each way.

C. Placing Concrete

(1) Inspection: All concrete excavations, trenches, forms, reinforcing miscellaneous steel and anchor bolt placement related items shall by inspected and approved by the Architect's representative prior to pouring any concrete. For this purpose, the Architect shall be notified 24 hours in advance by the Contractor of his intention to pour concrete.

(2) Concrete shall be placed in approximately horizontal layers not to exceed 12" in depth and the concrete pour shall be carried on in a continuous operation until the placing in the section or monolith is completed. Concrete shall be deposited at or near its final position to avoid segregation caused by rehandling or flowing. No concrete shall be dropped freely into place from a greater height than five feet. Tremies shall be used for placing concrete where the drop is in excess of such a height.

(3) Concrete shall be placed with the aid of approved mechanical vibrating equipment. Vibration shall be transmitted directly to the concrete, sufficiently intense to cause the concrete to settle readily into place and to visible affect the concrete over a radius of at least 18". Vibrators shall not, however, be used to transport concrete or force concrete to flow horizontally. Vibration shall be supplemented by manual forking or spading adjacent to the forms on exposed faces in order to secure smooth, dense surfaces. If, for any reason, the surfaces or interiors have voids or are in any way defective, such concrete shall be patched or repaired as directed by the Architect, and no defective work shall be patched or repaired without the prior inspection and approval of the Architect.

(4) Concrete placing shall continue without avoidable interruption unless otherwise specified, until the predetermined limit of the placement has been attained.

(5) Placing of concrete in which initial set has occurred or placing of retempered concrete will not be permitted. Concrete which has contained water for more than 90 minutes will not be accepted.

(6) When placing fresh concrete against old concrete, the latter shall be cleaned of all objectionable matter, and a proper bond shall be made by grouting with neat cement or painting with "Weldcrete".

D. Hot Weather Requirements
(1) Steps shall be taken as necessary to reduce concrete temperatures and water evaporation by proper attention to ingredients, production methods, handling, placing, and curing. During hot weather, concrete pours shall be scheduled for the early morning hours to maximum extent possible, to allow for placing, finishing and protection of the entire monolith poured by a time not later than 12:00 noon. Details of hot weather concrete pours shall be in accordance with ACI 305.

(2) Contractor shall provide fog spraying during placement of slabs-on-grade, or other methods approved by the architect, when the rate of evaporation equals or exceeds 0.2 pounds per square foot per hour as specified on the drawings.

E. Cold Weather Requirements

(1) Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

(2) No concrete shall be placed if anticipated temperatures of the surrounding air are to go below 30 degrees F, unless provisions are made for a heated enclosure for protection. Removal of forms during cold weather concreting shall be based on strength tests of field cured cylinders as directed and approved by Architect.

(3) When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degrees F, and not more than 80 degrees F at point of placement.

(4) Do not use frozen materials or materials containing ice or snow. Do not place concrete or frozen subgrade or on subgrade containing frozen materials.

(5) Do not use calcium chloride, salt or other materials containing antifreeze agents or chemical accelerators.

F. Curing Concrete

(1) Concrete shall be protected against loss of moisture, rapid drying or temperature changes, mechanical injury or injury from rain or flowing water for a period of at least seven days in accordance with requirements of ACI 308 and ACI 305, as specified herein. Curing shall commence as soon as free water has disappeared from the surfaces after finishing.

(2) Formed Surfaces: Forms in contact with concrete during the curing
period shall be kept wet. If forms are removed during the curing period, a curing method and/or materials, approved by the Architect, shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

(3) Curing may be accomplished by any of the following methods:

a. Mois Curing: Surfaces shall be kept continuously set by covering with burlap, mats or sand, thoroughly saturated with water and covering kept wet by spraying or hosing. Place materials to provide complete surface coverage and lap all joints minimum 3”.

b. Moisture-Retaining Cover Curing: Surfaces shall be thoroughly wetted with a fine spray of water and then covered with waterproof paper, polyethylene sheeting or polyethylene coated waterproof paper. Edges and ends of sheeting shall be overlapped not less than 4” and securely cemented or taped to form a continuous cover. Sheetin shall be weighted down to prevent displacement and shall be repaired or replaced if torn, damaged, or removed during curing period.

c. Liquid Membrane Forming Curing Compound: Compound shall not penetrate, stain, or have any deleterious effect on finish. Compound shall not be used on floors to receive dust preventative treatment or on slabs to receive additional concrete fill. Immediately following removal of forms, loose materials and debris shall be removed from surfaces, the surfaces thoroughly moistened with a light spray of water, and expansion joints and other joint openings covered to prevent compound from entering. Compound shall be applied on damp surfaces as soon as moisture film has disappeared. Power spraying equipment shall be used. Material shall be applied in a two-coat, continuous operation at a coverage of not more than 200 square feet per gallon for each coat. Second coat shall be applied in a direction at right angles to application direction of first coat. Compound shall provide a uniform, continuous, adherent film that shall not check, crack, or peel, and shall be free from pinholes or other imperfections. Surfaces subjected to heavy rainfall within 3 hours after compound has been applied or surfaces damaged by subsequent construction operations within curing period shall be resprayed at specified rate. Coated surfaces shall be kept free of foot and vehicular traffic and other sources of abrasion during curing period. After compound is dry, all surfaces to be subjected to traffic shall be covered with waterproof Kraft Paper, lapped 9”, and covered with sand.
G. Finishing After Removal of Forms

(1) Vertical Surfaces:

a. Immediately after removal of forms and before the concrete is dry, all excess projections and loose materials shall be removed; honeycomb, aggregate pockets, voids over 1/2" diameter and holes left by form ties cut back or undercut to solid concrete shall be thoroughly wetted, brush-coated with grout consisting of equal parts of Portland cement to two parts fine aggregate. When dry, mortar shall match concrete in color. Holes extending entirely through the walls shall be filled from back, forcing the mortar through the wall. Patching shall be damp cured for period as specified under CURING. Exposed patchwork shall be finished to match texture of adjacent concrete surfaces. All new surfaces adjacent to existing surfaces shall match existing finishes.

b. Smooth Finish: All exterior and interior exposed surfaces not otherwise noted shall be finished smooth. Mix 1 part Portland cement and 1-1/2 parts fine aggregate with water to produce a grout having the consistency of thick paint. White or light colored Portland cement shall be used to obtain the desire color. Wet surface to prevent absorption of water from grout. Apply grout uniformly, completely, filling air bubbles and holes. Immediately after applying grout, float the surface with cork or wood floats, scouring the wall vigorously. While grout is still plastic, surface shall be finished with a sponge rubber float, removing excess grout. The finishing shall be done at the time when grout will not be pulled from holes or depressions. After the surfaces have dried thoroughly, rub vigorously with dry burlap to completely remove dried grout. There shall be no visible film of grout remaining after rubbing. The entire finishing operation for any area shall be completed the day it is started. Grout shall not be left on the wall overnight. Finished surfaces shall be uniform in color and texture, without lap marks or clouding. Spots or streaks shall be retreated.

(2) Finishing Concrete Slabs:

a. Surface of concrete fill and slabs shall be at elevation to receive finish specified and noted. Finished fill and slabs shall be struck off true and level surfaces with a tolerance of 1/8 inch in 10 feet as measured with a 10 foot straigtedge and the Floor flatness and Floor Levelness criteria specified on the drawings. Upon completion of leveling, all screeds shall be removed and spaces filled with concrete. Finished work shall permit the free drainage of water from surface at
all points. Finishing may be by hand or power finishing machines. Joints and edges shall be straight and finished with jointing and edging tools.

b. Float Finish for interior slabs shall be obtained by screeding to finish elevation and all surface water and laitance removed. Floating shall commence as soon as screeded surface has sufficiently set. Floating may be performed by hand using a wood float, or by power driven floats to produce a smooth, even textured surface. Slabs in all areas which are to receive ceramic or quarry tile shall be float finished.

c. Monolithic Finish for interior slabs shall be obtained by striking off to true surface at finished elevation, then screeding and floating with straightedges to bring surface to finish level. While concrete is still green but sufficiently hardened to bear a man’s weight without deep imprint, it shall be wood-floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on floats to bring moisture to the surface. After surface moisture has disappeared, surfaces shall be steel-troweled to a smooth, even, impervious finish, free from trowel marks. When the concrete has sufficiently set to ring the trowel, the surface shall receive a second steel-troweling to a burnished finish except that surfaces receiving resilient flooring shall not receive the second steel troweling. All slab areas shall receive a monolithic finish except those specifically excluded under other finishes specified herein. Coordinate efforts where the concrete floor is the exposed surface to control finish and cracks.

d. Broomed Finish for exterior sidewalks, slabs, platforms, stair treads and ramps shall be finished by tamping the concrete to force coarse aggregate away from the surface, screeding and floating to bring surface to finish level, steel troweling to an even, smooth surface and then brooming with a fine hair broom in a direction transverse to that of the principal traffic, or in the patterned direction as indicated on the drawings.

e. Float Finish for exterior sidewalks shall be obtained by screeding to finish elevations and all surface water and laitance removed. Floating shall commence as soon as screened surface has sufficiently set. Floating may be performed by hand using a wood float, or by power driven, floats to produce a smooth, even textured surface. All slab edges, including those of formed joints, shall be finished carefully with an edger having a radius of 1/8 inch.

f. Non-Slip Aggregate Finish for interior stair treads, platforms, and elsewhere as shown on the Drawings or in schedules. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip
aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force the non-slip aggregate particles below surface. After broadcasting and tamping, apply trowel finishing as herein specified. After curing, lightly work the surface with a steel wire brush, or an abrasive stone, and water to expose the non-slip aggregate.

g. Chemical-Hardener Finish: In addition to finishing as specified for monolithic finish, apply chemical-hardener finish to interior concrete floors where shown on Drawings or on schedules as "exposed concrete".

1) Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water, and apply in three coats; first coat, 1/3 strength; second, 1/2 strength; third coat, 2/3 strength. Evenly apply each coat, and allow 24 hours for drying between coats. Apply proprietary chemical hardeners in accordance with manufacturer's printed instructions.

h. Exposed Aggregate Finish: Exposed aggregate exterior sidewalks shall be finished by tamping the concrete to force coarse aggregate away from the surface, screeding and floating to bring surface to finish level, steel troweling to an even, smooth surface. Apply 3/8" round rock (also known as river rock) densely and uniformly over the surface. Then roll the seeded aggregate into the surface to match the required finish elevation. Do the work carefully, avoiding uneven texture. Sample panel is required for the Architect's approval.

i. Rock Salt Finish: Apply non slip swirl rock salt finish to exterior walks and slabs as indicated.

1) Following completion of the troweling scatter 1/4" to 3/8" size rock salt particles uniformly over the surface, then press or roll the salt particles into the surface only a sufficient amount for the dissolved salt to leave 1/4" to 3/8" side pits or holes in the surface. After the concrete surface has completely hardened sufficiently not be damaged by washing, the salt is washed away by a thorough flooding with water.

H. Cement Mortar or Grout
(1) Cement mortar for the repair of imperfect concrete work, the filling of holes left by form bolts and ties, and the filling of voids, around piping through concrete shall consist of cement and sand mixed in the same proportion as used for the concrete being repaired, with only sufficient water to give the required consistency, but in no case shall the water-cement ratio be more than that specified for Class "A" concrete. Bolt holes shall be filled with dry pack mortar, well tamped down into holes.

(2) Grout for spreading over the surfaces of construction joints shall consist of water and cement mixed in the ratio of not to exceed seven gallons per sack with sufficient sand added to produce the desired workability of the mass.

(3) Cement mortar or grout that has not been placed within 30 minutes after mixing shall be wasted.

I. Inserts

(1) Pipes, anchor bolts, sleeves, reglets, casings and other inserts, as shown on the plans, or as required, shall be encased in the concrete unless otherwise noted.

(2) Contractor shall notify all subcontractors and other prime contractors who have items to be embedded in or pass through the concrete at least five days in advance of the placing of concrete.

(3) The Contractor shall leave any openings through the walls or floors as shown on Mechanical and Electrical drawings and other required openings as directed by the Architect. In case of any conflict with structural members, the Contractor shall notify the Architect and suitable solution resolved before the concrete is placed.

J. Cleaning

(1) After the concrete work is complete, carefully remove all excess concrete and all protective materials and broom the surfaces and remove all mortar and other foreign materials. All concrete inserts, anchors bolts, etc., shall be cleaned of all concrete after forms are removed.

K. Waste Management

(1) Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.

(2) Before concrete pours designate a location for cleaning out concrete trucks. Options include:
a. Company-owned site for that purpose (meeting environmental standards)
b. On-site area to be paved later in project.

END OF SECTION
033500 DENSIFIED CONCRETE FINISH

1. GENERAL:

A. Description of Work

(1) Work as evident on the drawings and specified herein or required for furnishing all labor, materials, equipment, and services necessary for the application of concrete densifier, sealer, and water and oil repellant, in conjunction with Section 033000, Cast-In-Place Concrete.

B. Related Work

(1) Section 033000: Cast-In-Place Concrete.

(2) Drawings: General Structural Notes and Room Finish Schedule.

C. Submittals

(1) Product data: Submit manufacturer’s product data and installation instructions. Include both published data and any specific data prepared for this project.

D. References and Standards

(1) American Concrete Institute (ACI):
   a. ACI 302.1 R-15, Guide for Concrete Floor and Slab Construction.

(2) American Society for Testing and Materials (ASTM):
   a. ASTM C805, Impact Strength.
   b. ASTM 1028, Co-efficient of Friction.
   c. ASTM C150, Type II Portland cement.

E. Quality Assurance

(1) Test Area: Test a representative area of 4 feet by 4 feet to confirm surface preparation procedures, coverage rates, reaction time, finished appearance, etc. Use the manufacturer’s application instructions. Let test area cure and dry thoroughly before inspection. Keep test area available for comparison throughout the project.
2. PRODUCTS:

A. Acceptable Manufacturers

(1) PROSOCO, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255; Fax: (785) 830-9797. E-mail: CustomerCare@prosoco.com.

(2) Approved equal by Architect. Manufacturers must have a complete system of products that match the types and descriptions below.

B. Product Descriptions

This specification is based upon the Consolideck system manufactured by PROSOCO, Inc. Other systems may be approved at the architect's discretion provided it meets the performance characteristics of the basis system.

(1) Concrete Sealer, Hardener, and Densifier: Consolideck LS lithium silicate treatment or approved equal.

(2) Concrete Protective Treatment: Consolideck LS Guard lithium silicate hardener or approved equal.

3. EXECUTION:

A. Preparation

(1) Surfaces to be treated must be clean and structurally sound. Remove all foreign materials including bond breakers, curing agents, surface grease and oil, and construction debris using the appropriate manufacturer's surface prep cleaner.

(2) Read “Preparation” and “Safety Information” sections in the manufacturer's Product Data Sheet for the product.

B. Placement

(1) Apply each product in strict accordance with manufacturer's instructions. Make note of the placement order, timing and critical interactions between the different products to ensure a properly stained densified concrete finish.

END OF SECTION
DIVISION 5 - STEEL

051200 STRUCTURAL STEEL

1. GENERAL

A. Description of Work

(1) Work as evident of Drawings and specified herein or required to accomplish the structural steel work.

(2) All steel exposed to view in the finished project shall be finished according to architecturally exposed structural steel requirements of ASCI.

B. Related Sections

(1) Section 054000: Light Gauge Structural Steel Stud System

(2) Section 055000: Metal Fabrications

(3) Section 131250: Metal Building Systems

(4) Section 033000: Cast-In-Place Concrete; setting of embedded items

C. Submittals

(1) Shop Drawings: Drawings shall be submitted for approval and shall include all shop and erection details; members and connections for any portion of the structure not shown on the Contract Drawings shall be detailed by the fabricator and indicated on the shop drawings. All welds shall be indicated by standard welding symbols of the AWS. Fabricator shall prepare his own original drawings. Prints made from modified reproductions of project structural drawings will not be allowed. Shop drawings shall be approved before fabrication, and shall be furnished in the form of one set of sepia transparencies and two sets of blue lines.

a. Submittals requiring structural design or calculations shall be sealed by a professional civil or structural engineer registered in the State of Arizona.

(2) In reviewing shop drawings, the Architect will attempt to detect omissions and major errors, but neither failure of the Architect to do this nor the reviewer of the shop drawings shall relieve the Contractor of his responsibility to comply with the Drawings and Specifications. Approval of shop drawings in no way relieves the
Contractor or fabricator of his responsibility for all errors of detailing, fabrication and erection, and for the correct fitting of structural members.

(3) Certification: Certified copies of mill test reports, including names and locations of mills and shops, shall be furnished for all structural steel.

(4) Weld Procedure Specifications: WPS in conformance with AWS requirements shall be submitted for each type of weld to be constructed.

D. Responsibility for Errors

(1) The Contractor shall be responsible for all errors of detailing fabrication, and for the correct fitting of the structural members.

E. Qualification of Welders

(1) Certification that each welder is qualified in accordance with AWS Code D1.1 shall be provided. Any welder shall be retested and recertified when the work of the welder creates a reasonable doubt as to his proficiency. Tests, when required, shall be conducted at no additional expense to the Owner. Recertification of the welder shall be submitted only after the welder has taken and passed the required retest. All welders shall have certificates issued within the previous 12 months and have a copy of the approved weld procedures specifications.

F. Delivery and Storage of Materials

(1) Delivery of items for this work shall be scheduled so as to cause no delay in this work or work of other trades.

(2) Anchor bolts and bolt setting plans shall be delivered to Contractor for setting, following Engineer's review of plans.

(3) All items for this work shall be ready for erection or installation in accordance with the construction schedule established by the Contractor.

(4) All items furnished for this work by this subcontractor shall be delivered to the proper subcontractor for setting.

(5) Materials shall be stored out of contact with the ground in such manner and location as will minimize contamination and deterioration.
G. Standards

(1) Conform to the applicable requirements and recommendation of the latest edition in effect of the following standards and to the Drawings and Specifications for the engineering design, fabrication and erection of structural steel.
   a. IBC International Building Code, Chapter 22.
   b. AISC Specification for Structural Steel for Buildings.
   c. AWS D1.1 Structural Welding Code.

2. PRODUCTS

A. Hot Rolled Structural Steel, Shapes, Plates and Bars

(1) Wide Flange shapes (“W” sections) shall be ASTM A992 and all other shapes shall be per ASTM Specification A36.

B. Steel Pipe

(1) ASTM A501 or A53, Type E or S, Grade B.

C. Structural Tubing

(1) ASTM A500, Grade B.

D. Anchor Rods (Anchor Bolts).

(1) ASTM F1554 Grade 36 (Fy = 36 KSI).

E. Plain threaded bars.

(1) A307, Grade A.

F. High Strength Bolts, Nuts, Washers

(1) ASTM A325-N

(2) ASTM A409-N when noted on the structural drawings.

G. Unfinished Bolts and Nuts

(1) ASTM A307, Grade A or ASTM A325N as indicated.
H. Welding Electrodes
   (1) AWS A5.1, E70 for manual shielded metal-arc process, and AWS A5.17, E70 for submerged-arc process.

I. Drill-In Expansion Anchors
   (1) The anchors shall be a non-drilling type see drawings for specific anchors to be used. All expansion and drill-in expansion anchors require Special Inspection.

J. Deformed Bar Anchors
   (1) ASTM A496, with minimum tensile strength of 70,000 psi as manufactured by Nelson Stud Welding Co., or approved comparable products.

K. Threaded Studs
   (1) Cold finished low carbon steel, 50,000 psi minimum yield strength, standard threaded studs with proper ferrules and flux, sizes and spacing as shown on Drawings and required by work. Manufacturers offering a product to comply with the requirements for threaded studs include KSM Products, Inc., Nelson Stud Welding Co., and RB & W Bolt and Nut Co.

L. Grout, Non-Shrink, Non-Metallic
   (1) Grout for column and beam bearings, "Five Star Grout" as manufactured by U.S. Grout Corp., Old Greenwich, Conn.

M. Paint for Shop and Field
   (1) Primer: SSPC-Paint 25, red iron oxide, zinc oxide, raw linseed oil and alkyd primer.

3. EXECUTION

A. Fabrication
   (1) Structural steel work material shall be in accordance with the applicable provisions of the AISC Specification. Fabrication and assembly shall be done in the shop to the greatest extent possible. Structural steelwork, except surfaces of steel to be encased in concrete and surfaces to be field welded, shall be prepared for painting in accordance with the AISC Specification and primed with paint materials here in before listed.
(2) Concrete anchors, shear connectors and deformed bar anchors shall be end welded to steel members with automatically timed stud welding equipment to produce an effective full penetration weld.

(3) In addition to special care used to handle and fabricate AESS, comply with the following:

a. Fabricate with exposed surfaces smooth, square, and free of surface blemishes.
b. Grind sheared, punched, and flame-cut edges smooth.
c. Fabricate with exposed surfaces free of mill marks.
d. Fabricate with exposed surfaces free of seams to maximum extent possible.
e. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
f. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
g. Fabricate to the tolerances specified in AISC 303 for steel that is not designated AESS.
h. Seal-weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates.

B. Erection

(1) The erection of structural steel shall be in accordance with the applicable provisions of the AISC Specification, and shall be installed by mechanics skilled in this type of work.

(2) Connections: Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work.

(3) Provide full bearing contact with non-shrink, non-metallic grout under all steel elements supported directly upon concrete. The grout shall be proportioned, mixed and placed in strict accordance with the manufacturer's published specifications.

C. Welding

(1) Shop and field welding processes and details, workmanship, quality control, inspection, and the qualification procedures for welders, tackers, and welding operators shall be as prescribed in the Structural Welding Code, AWS D1.1, of the American Welding Society.
(2) Field Welds shall be done by manual shielded metal-arc process.

(3) Shop and field welds shall be made only by welders, tackers, and welding operators who have been qualified by tests and hold a current valid certificate, issued by an approved Independent Testing Agency, to perform the type of welds required by the work. Copies of certificates shall be furnished upon request of the Architect.

D. High Strength Bolt Installation

(1) Install high strength bolts, nuts, washers, and direct tension indicators for friction-type connections in accordance with the Specification for Structural Joints Using ASTM A325 or A490 Bolts by the Research Council on Riveted and Bolted Structural Joints, and endorsed by the American Institute of Steel Construction and the Industrial Fasteners Institute. Install and tighten bolts in accordance with Section 5 (e) Tightening by Use of a Direct Tension Indicator, and in accordance with the manufacturer's published recommendations and specifications. Use both hardened washers and direct tension indicators as specified, recommended and required. The "turn-of-nut" tightening method is not acceptable.

E. Inspection

(1) Material and workmanship shall be subject to inspection by the Architect at all times. The Contractor and this subcontractor shall cooperate with the Architect permitting access for inspection to all phases of the work.

(2) The Contractor shall notify the Architect in advance, of the start of shop fabrication and field erection.

(3) This work may be inspected in the shop or place of manufacturer. Approval by the Architect in the shop or place of manufacturer of an item, detail, or phase of the work shall exclude it from reinspection in the field. However, subsequent alterations or damage to an approved items, detail, or phase of the work may be cause of approval to become void.

(4) Material and workmanship not conforming to the Specifications may be rejected at any time defects are found during the progress of the project.

(5) The Owner shall engage a testing laboratory, to rigidly inspect, test as required by nondestructive methods, and prepare and submit
reports to the Architect and Structural Engineer for compliance with Specifications and Drawings of the following structural connections and connectors:

a. Field and shop welded structural connections for columns, beams, braces and hangers, as follows:
   i. Visual inspection of all structural field and shop welds of all parts of all joints and connections, and of all other necessary structural welds shall be made by an approved welding inspector.
   ii. Nondestructive testing of structural field complete and partial joint penetration groove welds shall be made by an AWS approved welding inspector. The method of testing shall be complete ultrasonic testing, except radiographic testing shall be used when required by the welding inspector. All complete penetration groove welds require testing.

b. Inspection of A307 and A325-N field bolts, inspection shall be performed as often as is required to verify that at least 10% of all bolts and at least 2 bolts in each connection are properly installed and tightened to a "snug-tight" condition. Snug tight is defined as the tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. The same number of bolts shall be inspected that use fully pretensioned bolts as indicated on the structural drawings. It is expected that direct tension indicators will be used on these types of bolted connections.

c. Shear connector studs, workmanship, quality control, testing and inspection shall conform to AWS Code D1.1, 4, Technique, Part F.

d. Metal decking for floors and roof shall have puddle weld quality, number and location per sheet width, and seam connection quality and spacing visually inspected.

F. Painting

(1) One coat of shop paint shall be applied to all structural steel unless noted otherwise. Surface preparation and paint application shall conform to the procedures described in Section M3 of "Specifications for Structural Steel for Buildings", AISC.

(2) Shop painted steel, when marred by welding, bolting or erection shall be touch-up painted by the Erection Contractor in a manner approved by the Architect prior to the field painting.
(3) Touch-up painting of shop painted steel, when marred by the work of Trades or Subcontractors not performing the erection, shall be touch-up painted by the Trade or Subcontractor causing the damage, and in a manner approved by the Architect.

END OF SECTION
054000 LIGHT GAUGE STRUCTURAL STEEL STUD SYSTEM

1. GENERAL
   
   A. Description of Work
      
      (1) Work as evident on the drawings and specified herein or required to furnish and install the load bearing metal stud system, complete.
   
   B. Standards
      
      (1) Comply with the latest editions in effect of the following codes and standards, except as otherwise shown or specified:

         a. IBC  International Building Code, Chapter 22, Section 2210-2211
         b. ICC  Research Committee Recommendations
         c. ASTM American Society for Testing and Materials Standards
         d. AISI  Specification for Design of Cold-Formed Steel Structural Members
         e. AWS D1.3 Structural Welding Code.
   
   C. Submittals
      
      (1) Manufacturer's Data: Submit 3 copies of manufacturer's specifications for products to be used.

      (2) Shop Drawings: Submit shop drawings in accordance with Section 013300 Shop Drawings and Samples showing all shop drawings for fabrication and erection of light gage steel structural framing. Include plans, elevations, details of sections and connections, shop anchorage and accessory items.

      (3) In reviewing shop drawings, the Architect / Engineer will attempt to detect omissions and major errors, but neither failure of the Architect / Engineer to do this nor the review of the shop drawings shall relieve the Contractor of their responsibility to comply with the Drawings and Specifications. Approval of shop drawings in no way relieves the Contractor or fabricator of their responsibility for all errors of detailing, fabrication and erection, and for the correct fitting of structural members.

      (4) Certification: Certified copies of mill test reports, including names and locations of mills and shops, shall be furnished for all light gauge structural steel.
(5) **Weld Procedures Specifications:** WPS in conformance with AWS requirements shall be submitted for each type of weld to be constructed.

D. **Delivery, Storage and Handling**

(1) Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

(2) Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Repair or replace damaged materials as directed.

2. **PRODUCTS**

A. **Light Gage Steel Structural Framing**

(1) Members include, but not necessarily limited to, studs, tracks, bridging connections and anchorages, and all accessory items required by the work.

(2) These members and accessories shall be of the type, size, and gage as shown on drawings by design; and shall be cold-formed from steel meeting the following requirements:

   a. Painted 12, 14, and 16 gage structural studs, joists, tracks and diagonal straps: ASTM A1008, Grade 50, with a minimum yield stress of 50,000 psi.
   b. Painted 18 and 20 gage structural studs, joists and tracks; all painted bridging, end closures and accessories shall be formed from steel that corresponds to the requirements of ASTM A1003, Grade C with a minimum yield of 33,000 psi.
   c. Galvanized 12, 14, and 16 gage structural studs, joists, tracks and diagonal straps: ASTM A653, Grade D, with a minimum yield stress of 50,000 psi.
   d. Galvanized 18 and 20 gage structural studs, joists and tracks; bridging, end closures and accessories shall be formed from steel that corresponds to the requirements of ASTM A653, with a minimum yield of 33,000 psi.
   e. The minimum structural properties for structural studs to comply with the requirements shown on the drawings.

(3) All painted materials and accessories shall be primed with rust inhibitive paint.
(4) Welding electrodes: AWS A5.1, E70XX for manual shielded metal-arc welding.

3. EXECUTION

A. Framing

(1) Studs shall be seated squarely in upper and lower tracks with the stud web and flanges abutting the track web, and against structural steel members as shown on drawings. The studs shall be plumbed or aligned, and securely attached to the upper and lower tracks.

B. Connections

(1) Connections and attachments of similar members and components shall be done by screw attaching as shown on Drawings. Dissimilar members and components shall be attached by welding, screw attaching, or bolting. Wire tying of members and components shall not be allowed.

C. Splices

(1) Splices of runner track shall be made in accordance with details shown on the drawings.

(2) Splices shall not be allowed in vertical structural framing members, except in accordance with details shown on Drawings.

D. Bridging

(1) Provide two rows of bridging at approximately 1/3 height span apart, except where otherwise shown on Drawings.

E. Field Welding

(1) Welding shall be done using manual shielded metal-arc process or a wire feed type welder approved by the Architect. The welding process and details shall conform to the requirements of the Structural Welding Code (AWS D1.3) of the American Welding Society and the approved weld procedures specifications.

(2) Welds shall be made only by welders who have been qualified by tests and hold a current valid certificate, issued by an approved independent testing laboratory, to perform the type of welds required by the work. The qualifying tests shall be as prescribed in the Structural Welding Code (AWS D1.3) of the American Welding Society (AWS). Copies of the welders or welding operators'
certificates shall be furnished by this Contractor upon request of the Architect/Engineer.

(3) All welds shall be fillet, butt, plug, or seam, and shall be sufficient to develop connections.

(4) Prior to commencing welding, the welders shall demonstrate their ability to the Architect that they can satisfactorily produce the welds herein before specified and/or shown on Drawings. In order to demonstrate their ability, the welders shall weld together samples of light gage steel structural framing members simulating each type of weld (fillet, butt, plug, or seam) that is required by the work.

(5) The subcontractor shall comply with all demands of the Architect/Engineer (welding inspector) to correct improper workmanship and to remove and replace, or correct as instructed, all welds which do not comply with drawings and specifications. In the event that faulty welding, or its removal for rewelding, shall so damage the base metal that its retention is not in accordance with the intent of the drawings and specifications, this subcontractor shall remove and replace the damaged materials or shall compensate for the deficiency in a manner approved by the welding inspector.

F. Field Painting

(1) Shop painted light gage steel structural framing furnished by the subcontractor, when marred by the work of other trades or welding, bolting, or erection, shall be touch-up painted in a manner approved by the Architect.
055000 METAL FABRICATIONS

1. GENERAL

A. Summary

   (1) This Section includes the following:

   a. Steel ladders
   b. Ladder safety cages
   c. Loose bearing and leveling plates
   d. Loose steel lintels
   e. Shelf angles
   f. Miscellaneous steel framing and supports
   g. Miscellaneous steel trim
   h. Structural-steel door frames
   i. Extruded nosings and treads
   j. Pipe guards
   k. Pipe bollards

B. Submittals

   (1) Shop Drawings: Furnish shop drawings in accordance with Section 013300 Shop Drawings and Samples showing all plans, elevations, sections, details of installation, and attachments to other Work. Shop drawings shall be approved before fabrication.

   (2) In reviewing shop drawings, the Architect / Engineer will attempt to detect omissions and major errors, but neither failure of the Architect / Engineer to do this nor the review of the shop drawings shall relieve the Contractor of their responsibility to comply with the Drawings and Specifications. Approval of shop drawings in no way relieves the Contractor or fabricator of their responsibility for all errors of detailing, fabrication and erection, and for the correct fitting of structural members.

   (3) Templates: For anchor bolts.

   (4) Samples: For each type and finish of extruded nosing and tread.

2. PRODUCTS

A. Metals

   (1) Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals:
(1) Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

(2) Steel Tubing: Cold-formed steel tubing complying with ASTM A500.

(3) Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

(4) Slotted Channel Framing: Cold-formed metal channels 1-5/8 by 1-5/8 inches with flange edges returned toward web and with 9/16-inch-wide slotted holes in webs at 2 inches o.c. Channels made from galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 with G90 coating; 0.079-inch nominal thickness.

(5) Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A153/A 153M.

C. Aluminum:


D. Paint

(1) Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664 and compatible with finish paint systems indicated.

a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   i. Carboline Company; Carboline 621.

(2) Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for re-galvanizing welds in steel.
E. Miscellaneous Materials

(1) Fasteners: Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls, of type, grade, and class required by application indicated.

(2) Nonshrink, Nonmetallic Grout: ASTM C 1107, factory-packaged, nonstaining, noncorrosive, nongaseous grout.

F. Fabrication

(1) Connections, General: Use connections that maintain structural value of joined pieces.

a. Shear and punch metals cleanly and accurately. Remove burrs.

b. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.

c. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes.

d. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

(2) Steel Ladders: Comply with ANSI A14.3, unless otherwise indicated.

a. Side rails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges, spaced 18 inches apart.

b. Bar Rungs: 3/4-inch-diameter steel bars, spaced 12 inches o.c.

i. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.

c. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
d. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or riveting.

e. Galvanize exterior ladders and safety cages.

(3) Loose Bearing and Leveling Plates: Fabricate loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

(4) Loose Steel Lintels: Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

(5) Miscellaneous Framing and Supports: Fabricate steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work from structural steel of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

a. Where indicated to be cast into concrete or built into masonry, equip with integrally welded anchors at 24 in. o.c.

b. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.

(6) Miscellaneous Steel Trim: Fabricate units with continuously welded joints and smooth exposed edges. Miter corners and use concealed splices where possible. Fabricate cutouts, fittings, and anchorages; coordinate assembly and installation with other work.

(7) Structural-Steel Door Frames: Fabricate from structural shapes and bars fully welded together, with 5/8-by-1-1/2-inch steel channel stops secured with countersunk machine screws. Reinforce frames and drill and tap as necessary to accept finish hardware.

a. Fabricate with steel strap anchors, with a minimum 6-inch embedment, welded to frame jambs no more than 12 inches from both bottom and head of frame, and not more than 30 inches apart.

b. Extend bottom of frames to floor with steel angle clips welded to frames.

c. Galvanize exterior frames.
(8) Pipe Guards: 3-by-3-by-5/16-inch steel angles, extending from floor to 42 inches above floor, with 3/8-inch steel baseplates for bolting to floor. Provide at least two vertical angles at each location. Connect tops of angles and anchor to wall or column with 1/4-by-2-inch steel strap braces welded to angles and bolted to wall.

(9) Pipe Bollards: Fabricate from Schedule 40 steel pipe.

G. Finishes

(1) Finish metal fabrications after assembly. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Shop prime ferrous-metal items not indicated to be galvanized.

(2) Hot-dip galvanize items indicated to be galvanized to comply with ASTM A123 or ASTM A153/A 153M as applicable.

(3) Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

(4) Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

3. EXECUTION

A. Installation

(1) General: Provide anchorage devices and fasteners for securing metal fabrications to in-place construction. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

a. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

b. Fit exposed connections accurately together. Weld connections, unless otherwise indicated. Do not weld, cut, or abrade galvanized surfaces.

(2) Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been
positioned and plumbed, tighten anchor bolts and pack with nonshrink, nonmetallic grout.

(3) **Bollards:**

a. Anchor in place with concrete footings. Support and brace bollards in position in footing excavations until concrete has been placed and cured.

b. Fill bollards solidly with concrete, mounding top surface.

(4) **Touch up surfaces and finishes after erection.**

a. **Painted Surfaces:** Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.

b. **Galvanized Surfaces:** Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION
END OF DIVISION
DIVISION 6 – WOOD AND PLASTICS

064116 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

1. GENERAL:
   A. Scope: Furnish and install all millwork and finish carpentry shown on the drawings and specified herein.
   B. The Quality Standards of the Architectural Woodwork Institute (AWI) shall apply to all work covered by this section.
   C. Millwork fabricator shall submit detailed shop drawings to be approved by the architect before fabrication.

2. MATERIALS:
   All products shall be formaldehyde free.
   A. Exposed Cabinet Surfaces: 3/4” laminate-clad medium density particleboard. ½” laminate clad plywood for curved surfaces.
   B. Edge band: 1/8” PVC.
   C. Hardware:
      (1) Butt Hinges: 2-3/4-inch (70-mm), five-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
         a. Concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
      (2) Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.
      (3) Catches: Magnetic catches, BHMA A156.9, B03141.
      (4) Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
      (5) Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
      (6) Drawer Slides: BHMA A156.9.
         a. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
b. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.

c. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.

(7) Door Locks: BHMA A156.11, E07121.

(8) Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18. Matte Stainless Steel.

D. Counter Tops: Counter tops shall be as follows per drawings and schedules:

(1) Plastic laminate clad, 3/4" moisture resistant MDF with .02" laminate backer sheet.

E. Plastic laminates shall be as manufactured by Wilson Art, Formica or Nevamar, 1/16" thick standard grade solid colors, unless noted otherwise, as selected by architect. Matte finish. Installation per all manufacturer's requirements.

K. Adhesives per all Manufacturer's requirements.

3. WORKMANSHIP:

A. Details and Special Conditions: All cabinetwork shall be flush overlay construction, Section 400G-2, AWI quality standards. No exposed substrate edges. Where details and methods of construction are not specifically shown on the drawings, contractor shall request clarification from the architect.

B. Work assembled at mill as far as practical and delivered ready for installation. This contractor responsible for measurements taken at job allowing for cutting and fitting. Doors and drawers shall be aligned and flush, 1/8" maximum space between, Section 400A-T-1, AWI quality standards.

C. All cabinetwork shall be custom grade in accordance with the latest edition of The Architectural Woodwork Institute (AWI).

D. Face frame shall be scribed where cabinetwork abuts walls.

E. This contractor shall install all finish hardware.
DIVISION 7 – THERMAL AND MOISTURE PROTECTION

072100 THERMAL INSULATION

1. GENERAL:
   A. SCOPE: Furnish and install insulation as indicated on drawings and specifications.
   B. Work Not Included: Duct and pipe insulation, rigid type roof insulation.

2. MATERIALS:
   A. Thermal & Sound Batt Insulation
      (1) Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch-(51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
      (2) Unfaced Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch-(51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
         a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method
      (3) Mineral-Fiber-Blanket Insulation: ASTM C 665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool
         a. Nonreflective Faced: Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
         b. Unfaced: Type I (blankets without membrane covering), passing ASTM E 136 for combustion characteristics.
            1) Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.

(4) Above ceilings and concealed locations: Reinforced-foil-faced glass fiber thermal insulation complying with ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category I (membrane is a vapor barrier), faced with foil scrim, foil scrim kraft, or foil-scrim polyethylene.

(5) Exposed in all other areas: Polypropylene fiberglass / polypropylene blend fabric facing, GYMGUARD by LAMTEC Corp. or approved equal, complying with ASTM E 84.
   a. White Film: Metalized polypropylene, .0015 inch.
   b. Fabric: Fiberglass / polyester blend, 75 lbs. / 3000 S.F.
   c. Vapor Retarder Perm Rating: .02 Maximum when tested in accordance with ASTM E 96.
   d. Surface Burning Characteristics:
      1) Maximum flame spread: 5
      2) Maximum smoke developed: 40
   e. Bursting Strength: 250 psi per ASTM D 774.
   f. Puncture Resistance: 650 Beach units per ASTM C 1136.
   g. Tensile Strength: 195 lbs. / inch width per ASTM 1136.

(6) Retainer Strips: 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

(7) Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

B. Roof Insulation:

(1) R-Value 38 when tested in accordance with ASTM C 518. Thickness 12".

C. Wall Insulation:

(1) R-Value 19 when tested in accordance with ASTM C 518. Thickness 6".
D. Sound Batt Insulation

(1) Unfaced glass fiber insulation complying with ASTM C 665, Type I and ASTM E 136.
   a. R-Value 11 when tested in accordance with ASTM C 518.
   b. Surface Burning Characteristics:
      1) Unfaced Insulation
      2) Maximum flame spread: 10
      3) Maximum smoke developed: 10
   When tested in accordance with ASTM E 84

3. EXECUTION:

A. Blankets shall completely cover enclosed building space between exterior walls and roof and shall fit snugly together to form a uniform continuous, leak free, efficient insulative barrier. Care shall be taken to properly cover protrusions and penetrations.

B. All installations shall be in accordance with the latest edition of the IBC.

C. Comply with manufacturer’s instructions for particular conditions of installation in each case.

D. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.

E. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.

F. Under Roof Decks

(1) Apply insulation directly to the interior surface of the underside of roof deck with appropriate anchors per the manufacturer’s recommendations.

G. Between Studs:

(1) Friction-fit insulation between studs after cover material has been installed on one side of the cavity. Use wire or metal straps to hold insulation in place in applications without a cover material or where the stud depth is larger than the insulation thickness. When faced insulation is used, the attachment flanges may be taped to the face
of the metal stud prior to applying the interior finish.

(2) Provide supplementary support to hold the product in place until finish surface is applied when insulation is installed in heights over 8 feet.

H. Sound Attenuation Blankets: Install 3" batts in office walls and sound rated partitions indicated on drawings. Blankets shall be friction fit and completely fill spaces.

I. Separate and recycle waste materials to the greatest extent possible.

END OF SECTION
074210 METAL ROOF AND WALL PANEL SYSTEMS

1. GENERAL

A. RELATED DOCUMENTS

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

B. SUMMARY

   (1) All material, labor, and equipment to complete the metal roof, wall and soffit panels including all necessary trim, flashing, seals, copings, and accessories.

   (2) Section Includes:

      a. Metal roof panels.
      b. Metal wall panels.
      c. Metal soffit panels.
      d. Metal liner panels.
      e. Gutters and downspouts.
      f. Accessories.

C. DEFINITIONS

   (1) Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

D. ACTION SUBMITTALS

   (1) Product Data: For each type of metal panel system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

      a. Metal roof panels.
      b. Metal wall panels.
      c. Metal soffit panels.
d. Metal liner panels.

e. Flashing and trim.

f. Accessories.

(2) Shop Drawings: Furnish shop drawings in accordance with Section 013300 Shop Drawings and Samples, for the following metal panel system components. Include plans, details, and attachments to other work.

a. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.

b. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):

   i. Flashing and trim.
   ii. Louvers.

(3) Samples for Initial Selection: For units with factory-applied color finish.

(4) Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:

a. Metal and Translucent Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.

E. PERFORMANCE REQUIREMENTS

(1) Air Infiltration: ASTM E 283.

(2) Water Penetration under Static Pressure: ASTM E 331.

(3) Water Penetration under Dynamic Pressure: AAMA 501.1.

(4) Structural Performance: ASTM E 1592.

   b. Deflection Limits: 1/180.
F. CLOSEOUT SUBMITTALS

(1) Maintenance Data: For metal panel finishes to include in maintenance manuals.

G. DELIVERY, STORAGE, AND HANDLING

(1) Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

(2) Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

(3) Stack metal panels horizontally on platforms or pallets, covered with suitable weather tight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

H. PROJECT CONDITIONS

(1) Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

(2) Field Measurements:

a. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.

b. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

I. COORDINATION
(1) Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

J. WARRANTY

(1) Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

a. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

   i. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   ii. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   iii. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

b. Finish Warranty Period: 10 years from date of Substantial Completion.

(2) Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.

a. Warranty Period: 20 years from date of Substantial Completion.

2. PRODUCTS

A. ACCEPTABLE MANUFACTURERS AND INSTALLERS

(1) The panel manufacturer shall have been in business as a panel manufacturer for at least 15 years.

(2) The manufacturer shall authorize the installer and actual work shall be supervised by personnel trained by the manufacturer in the proper application of the product.

(3) The installer shall have a minimum of five (5) years experience with similar type products. The installer must list five similar projects prior to the commencement of work.
B. METAL ROOF PANELS

(1) Vertical-Rib, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

   i. Exterior Finish: Siliconized polyester.
   ii. Color: As selected by Architect from manufacturer's full range.

b. Clips: Manufacturer's standard, fixed type or floating type to accommodate thermal movement; fabricated from zinc-coated steel sheet.

c. Joint Type: Panels snapped together.

d. Joint Type: Mechanically seamed, folded according to manufacturer's standard.

e. Panel Coverage: 16 inches.

f. Panel Height: 2 inches.

g. Uplift Rating: UL 90.

(2) Materials:

a. Metallic-Coated Steel Sheet: Restricted-flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   i. Zinc-Coated Steel Sheet: ASTM A 653/ A 653M, G90 coating designation; structural quality.
   ii. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/ A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
   iii. Surface: Smooth, flat finish.

(3) Finishes:

a. Exposed Coil-Coated Finish:
i. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

b. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

C. METAL WALL PANELS

(1) Exposed-Fastener Metal Wall Panels: PBR metal panels formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.


i. Exterior Finish: Siliconized polyester.
ii. Color: As selected by Architect from manufacturer's full range.

b. Major-Rib Spacing: 12 inches o.c.

c. Panel Coverage: 36 inches.

d. Panel Height: 1.25 inches or 1.5 inches.

(2) Flat Metal Liner Panels: Formed with vertical ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.


ii. Color: As selected by Architect from manufacturer's full range.

b. Major-Rib Spacing: 12 inches o.c.

c. Panel Coverage: 12 inches.

d. Panel Height: 1.25 inches or 1.5 inches.
(3) Materials:

a. Metallic-Coated Steel Sheet: Restricted-flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

i. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

ii. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.

iii. Surface: Smooth, flat finish.

(4) Finishes:

a. Exposed Coil-Coated Finish:

i. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

b. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

D. METAL SOFFIT PANELS

(1) General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

(2) Flat-Profile, Concealed-Fastener Metal Soffit Panels: Formed with vertical panel edges, with flush joints between panels, field assembled with nested lapped edges, and attached to supports using concealed fasteners.


i. Exterior Finish: Siliconized polyester.

ii. Color: As selected by Architect from manufacturer's full range.
b. Panel Coverage: 12 inches.

c. Panel Height: 1.25 inches.

E. ACCESSORIES

(1) General: Provide accessories as standard with metal panel system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer’s standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

a. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

(2) Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

a. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.

b. Clips: Manufacturer’s standard, formed from steel sheet, designed to withstand negative-load requirements.

c. Cleats: Manufacturer’s standard, mechanically seamed cleats formed from steel sheet.

d. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

e. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

f. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.
Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

a. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.

b. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

c. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

Flashing and Trim: Formed from 26 gauge nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.

a. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.

b. Opening Trim: Formed from 22 gauge nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

Gutters: Formed from 22 gauge nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

a. Gutter Supports: Fabricated from same material and finish as gutters as required for snow conditions.
b. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

(6) Downspouts: Formed from 24 gauge nominal-thickness, zinc-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.

a. Mounting Straps: Fabricated from same material and finish as gutters.

(7) Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

(8) Materials:

a. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

i. Fasteners for Metal Roof Panels: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless-steel cap or zinc-aluminum-alloy head and EPDM sealing washer.

ii. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.

iii. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless-steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM sealing washers bearing on weather side of metal panels.

iv. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.

v. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

b. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
c. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

d. Metal Panel Sealants:
   
i. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
   
ii. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

F. FABRICATION

(1) General: Design components and field connections required for erection to permit easy assembly.
   
a. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
   
b. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

(2) Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

(3) Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
   
a. Make shop connections by welding or by using high-strength bolts.
   
b. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
   
c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web
and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.

d. Weld clips to frames for attaching secondary framing.

e. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

(4) Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

a. Make shop connections by welding or by using non-high-strength bolts.

b. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

(5) Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer’s standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

a. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

3. EXECUTION

A. EXAMINATION

(1) Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

(2) Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer’s tolerances.

a. Engage land surveyor to perform surveying.
(3) Proceed with erection only after unsatisfactory conditions have been corrected.

B. PREPARATION

(1) Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

(2) Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

C. METAL PANEL INSTALLATION, GENERAL

(1) Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

a. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

(2) General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

a. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

i. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.

b. Install metal panels perpendicular to structural supports unless otherwise indicated.

c. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.

d. Locate and space fastenings in uniform vertical and horizontal alignment.
e. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.

f. Lap metal flashing over metal panels to allow moisture to run over and off the material.

(3) Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

a. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

(4) Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

(5) Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

a. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.

b. Prepare joints and apply sealants to comply with requirements in Section 07901 "Caulking and Sealants."

D. METAL ROOF PANEL INSTALLATION

(1) General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.

a. Install hip caps as metal roof panel work proceeds.

b. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
(2) Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

a. Install clips to supports with self-drilling or self-tapping fasteners.

b. Install pressure plates at locations indicated in manufacturer’s written installation instructions.

c. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.

d. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.

e. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.

f. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge and hip caps.

(3) Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

(4) Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

E. METAL WALL PANEL INSTALLATION

(1) General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

a. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
b. Shim or otherwise plumb substrates receiving metal wall panels.

c. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.

d. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.

e. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.

f. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.

g. Install screw fasteners in predrilled holes.

h. Install flashing and trim as metal wall panel work proceeds.

i. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.

j. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.

k. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

(2) Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

(3) Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

F. METAL SOFFIT PANEL INSTALLATION

(1) Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.
(2) Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

G. ACCESSORY INSTALLATION

(1) General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

   a. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

   b. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

   c. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

(2) Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

   a. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

   b. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion
joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

(3) Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer’s standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

(4) Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

   a. Provide elbows at base of downspouts to direct water away from building.

(5) Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.

(6) Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

H. CLEANING AND PROTECTION

(1) Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer’s written instructions.

(2) Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

   a. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION
076200  SHEET METAL FLASHING AND TRIM

1.  GENERAL

A  SUMMARY

(1)  Section Includes:
   a.  Manufactured reglets and counterflashing.
   b.  Formed roof drainage sheet metal fabrications.
   c.  Formed low-slope roof sheet metal fabrications.
   d.  Formed wall sheet metal fabrications.

B  ACTION SUBMITTALS

(1)  Product Data:  For each type of product indicated.

(2)  Shop Drawings:  Show installation layouts of sheet metal flashing
    and trim, including plans, elevations, expansion-joint locations, and
    keyed details.  Distinguish between shop- and field-assembled
    work.
    a.  Include details for forming, joining, supporting, and securing
        sheet metal flashing and trim, including pattern of seams,
        termination points, fixed points, expansion joints, expansion-
        joint covers, edge conditions, special conditions, and
        connections to adjoining work.

C  CLOSEOUT SUBMITTALS

(1)  Maintenance data.

D  QUALITY ASSURANCE

(1)  Sheet Metal Flashing and Trim Standard:  Comply with SMACNA's
    "Architectural Sheet Metal Manual" unless more stringent
    requirements are specified or shown on Drawings.

(2)  Preinstallation Conference:  Conduct conference at Project site.

E  WARRANTY

(1)  Special Warranty on Finishes:  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 20 years from date of Substantial Completion.

2. PRODUCTS

A SHEET METALS

(1) General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

(2) Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Exposed Coil-Coated Finish:
      i. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
   b. Color: As selected by Architect from manufacturer's full range.

B MISCELLANEOUS MATERIALS

(1) General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

(2) Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
   a. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
      i. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.

(3) Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
(4) Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

(5) Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

(6) Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

(7) Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

C FABRICATION, GENERAL

(1) General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

a. Obtain field measurements for accurate fit before shop fabrication.

b. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

c. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

(2) Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

(3) Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

(4) Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

(5) Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
D  ROOF DRAINAGE SHEET METAL FABRICATIONS

(1)  Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.

(2)  Downspouts: Fabricate from sheet metal. See drawings.

3.  EXECUTION

A  UNDERLAYMENT INSTALLATION

(1)  Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches (50 mm).

B  INSTALLATION, GENERAL

(1)  General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

a. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

b. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

c. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

d. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

e. Install sealant tape where indicated.
f. Torch cutting of sheet metal flashing and trim is not permitted.

(2) Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.

a. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

(3) Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

(4) Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

(5) Seal joints as shown and as required for watertight construction.

(6) Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.

a. Do not solder metallic-coated steel and aluminum sheet.

b. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

(7) Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

C ROOF DRAINAGE SYSTEM INSTALLATION

(1) General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
D ROOF FLASHING INSTALLATION

(1) General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

(2) Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

(3) Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
   a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
   b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

(4) Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

(5) Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.

(6) Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

E CLEANING AND PROTECTION

(1) Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

(2) Clean and neutralize flux materials. Clean off excess solder and sealants.
(3) Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION
079200 JOINT SEALANTS

1. SCOPE:

   A. Sealant shall be installed at all intersections of dissimilar materials and elsewhere to provide an entirely weather-tight building. Color as selected by Architect to blend with surrounding surfaces.

   B. Related Sections:

      (1) Section 03300: Cast-in-Place Concrete
      (2) Section 042000: Unit Masonry
      (3) Section 064116: Plastic Laminate Faced Architectural Cabinets
      (4) Section 081113: Metal Doors and Frames
      (5) Section 084113: Aluminum Entrance and Window Frames
      (6) Section 092900: Gypsum Wallboard
      (7) Section 099000: Painting

   C. Submittals:

      (1) Product data for interior sealants including printed statement of VOC content.

2. MATERIALS:

   A. General: VOC of interior sealants and sealant primers must comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      (1) Sealants: Not more than 250 g/L
      (2) Sealant Primers for Nonporous Substrates: Not more than 20 g/L
      (3) Sealant Primers for Porous Substrates: Not more than 775 g/L

   B. Sealants Type A - Silicone

      (1) GE - Silpruf 2000
      (2) Dow Corning - 795
      (3) Tremco - Spectrem 2

   C. Sealants Type B – Silicone-Urethane Hybrid (paintable)

      (1) Sika – Sika Hi-flex 150 LM

   D. Sealants Type C - Siliconized Acrylic

      (1) GE
E. Sealants Type D - Tapes
   (1) Norseal V-740 closed cell PVC
   (2) Emseal
   (3) Sonneborn

F. Sealants Type E - Mildew Resistant Silicone
   (1) Dow Corning - 786
   (2) Tremco

G. Polyethylene Foam Backer Rod.

3. INSTALLATION:
   A. Install all sealants in strict accordance with manufacturer's requirements.
   B. Sealant selected shall be appropriate for materials adjoining joint and for anticipated movement.
      (1) Type A: Storefront weather seals, storefront perimeter seals, joints with up to 50% anticipated movement.
      (2) Type B: Masonry control joints, masonry perimeter joints, concrete joints, joints with up to 25% anticipated movement.
      (3) Type C: Interior door frame perimeter, intersections between millwork and walls, surfaces requiring painting, joints with up to 7.5% anticipated movement.
      (4) Type D: Joints between concrete and aluminum shapes and joints between irregular surfaces and machined surfaces.
      (5) Type E: Provide mildew resistant caulking at all damp areas.
   C. Drive compound into joint grooves with enough pressure to force out all air and solidly fill joint. Deep voids shall be filled with backer rod so that the tooled thickness of the caulk is approximately ½ the width of the joint.
   D. Exposed sealant shall be free from wrinkles and uniformly smooth. Caulking around openings shall mean entire perimeter.
   E. Adjoining surfaces shall be cleaned of any smears of compound.

END OF SECTION
END OF DIVISION
DIVISION 8 - DOORS AND WINDOWS

081113 METAL DOORS AND FRAMES

1. GENERAL:
   A. Scope:
      (1) Provide all labor and material for a complete installation at locations shown on the drawings and/or as described in the door schedule.

   B. Related Sections:

   C. Submittals
      (1) Shop drawings: Submit shop drawings for approval prior to fabrication.
      (2) Both doors and frames shall be provided by the same manufacturer.

2. MATERIALS:
   A. Hollow Metal Doors & Frames shall be made per NAAMM Standard HMMA 862 (with the modifications listed below) as manufactured by Southwestern Door, Commercial Door and Hardware, or any door company that is a member of the Hollow Metal Manufacturers Association.

   B. Doors:
      (1) Face Sheets; Interior and Exterior Doors: 16 gage.
      (2) Minimum thickness: 1 3/4"
      (3) Stiffeners: 18 gage, 6" spacing, spot-welded to both face sheets 5" O.C.
      (4) Vertical Edge: Continuous weld.
      (5) Top and bottom edges: Closed with 14 gauge continuous steel channel. Flush, top and bottom, not recessed.
      (6) Glass Molding and Stops: Fixed moldings welded to door on security side, all stops 16 gage. All screws shall be countersunk.
C. Frames:

(1) Interior and Exterior: 14 gauge.

(2) Construction: Welded units with integral stop and trim.

(3) Floor Anchors: 14 gauge weld inside jambs.

(4) Jamb anchors: In masonry 14 gauge steel. For stud partitions 16 gauge steel anchors.

D. Hardware reinforcement:

(1) Door hinges: 3/16" plate.

(2) Lockface, flush bolts and closures L12 gauge steel.

(3) Frame hinge: 3/16" plate.

3. INSTALLATION:

A. Install in accordance with manufacturer's recommendations. Field verify all conditions. Anchor frames with four anchors each side.

B. Pack frames solid with monocote in framed walls.

END OF SECTION
083323 OVERHEAD COILING DOOR

1. GENERAL

A. Related Documents

(1) All of the Contract Documents, including General and Supplementary Conditions, and Division 1 General Requirements, apply to the work of this Section.

B. Summary

(1) The work of this Section includes electric operated overhead coiling doors.

C. Related Sections

Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:

(1) Section 087100 - Finish Hardware; key cylinders for locks.

D. Submittals

(1) Product Data: Submit manufacturer’s product data and installation instructions for each type of rolling door. Include both published data and any specific data prepared for this project.

(2) Shop Drawings: Submit shop drawings for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

E. Quality Assurance

(1) Manufacturer: Overhead coiling doors shall be manufactured by a firm with a minimum of five years experience in the fabrication and installation of rolling doors. Manufacturers proposed for use, which are not named in these specifications, shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five projects of similar design and complexity completed within the past five years.

(2) Installer: Installation of overhead coiling doors shall be performed by an authorized representative of the manufacturer.
(3) Single-Source Responsibility: Provide doors, guides, motors, and related primary components from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

(4) Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

F. Delivery, Storage, and Handling

(1) Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer’s instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

2. PRODUCTS

A. Acceptable Manufacturer

(1) Overhead Door Corporation, Cookson or approved equal.

B. Rolling Doors

(1) Basis of Design: 625 S Series Insulated Stormtite Springless Service Doors by Overhead Door Corporation.

(2) Curtain: Galvanized steel interlocking roll-formed slats, end locks attached to prevent lateral movement
   a. Insulated flat profile (F-265i) for doors up to 30’ wide – front and back slats 24 gauge. Slat cavity shall be filled with CFC-free, foamed in-place, polyurethane insulation.

(3) Finish:
   a. Aluminum: Slats and hood shall be aluminum with clear anodized finish.

(4) Color: Clear anodized aluminum.

(5) Windload Design: 20 PSF.

(6) Weatherseals: Vinyl bottom seal, exterior guide and internal hood seals.
(7) Bottom Bar: Extruded aluminum up to 15'4" wide. Two steel angles over 15'4" wide.

(8) Guides: Roll-formed steel shapes attached to continuous steel wall angle for doors up to 15'4" wide. Three structural steel angles with minimum thickness of 3/16" for doors over 15'4" wide. Guides shall be weatherstripped with a vinyl weather seal at each jamb on the exterior curtain side.

(9) Brackets: Hot rolled steel to support counterbalance, curtain and hood.

(10) Door Roll: Direct driven, springless roll with integrated shafts; self-aligning grease-able sealed bearings; door does not require counterbalance device.

(11) Hood: Galvanized steel, 24 gauge Aluminum hood with intermediate supports as required. Provide with internal hood baffle weatherseal.

(12) Wall Mounting Condition: Interior face of wall mounting.

(13) Control Panel: Electronic controller with microprocessor self-diagnostics. Digital readout indicates door action, alarm conditions, and fault conditions. Time delay self-close timer and non-resettable cycle counter is included. One open/close/stop push button station integrated in control panel. Enclosure is IP54 rated (NEMA 3 equivalent).

(14) Safety devices: Built-in braking mechanism provides additional peace-of-mind against uncontrolled curtain travel. Photoelectric safety sensors with guards – provide obstruction monitoring during door operation to help prevent injury and damage.

(15) Operation: Electric switch operated with manual override. Direct drive integrated gear/motor/brake assembly; Drive assembly and limit sensors are factory re-assembled; Manual hand chain for power outage. Horsepower appropriate to door size/weight; 230V AC 3-phase motor (operating range 208-245V).

3. EXECUTION

A. Preparation
(1) Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

B. Installation

(1) Strictly comply with manufacturer’s installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

(2) Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

C. Adjusting and Cleaning

(1) Test rolling doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.

(2) Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

END OF SECTION
084113 ALUMINUM ENTRANCE AND WINDOW FRAMES

1. GENERAL
   A. Furnish all necessary materials, labor and equipment for the complete installation of aluminum framing as indicated on the drawings.
   B. Submittals:
      (1) Submit shop drawings to the architect for approval in accordance with general conditions. Obtain approval of shop drawings prior to fabrication.

2. MATERIALS
   A. Aluminum Horizontal Sliding Window: Medium duty commercial series horizontal sliding window by CR Lawrence, Kawneer, Arcadia, US Aluminum or equal.
   B. Finish: All exposed framing surfaces shall be free of scratches and other serious blemishes. Color shall be clear anodized.
   C. Hardware: Refer to Section 087100.

3. INSTALLATION
   A. All framing shall be set in correct locations as shown in the details and shall be level, square, plumb, and in alignment with other work in accordance with the manufacturer’s installation instructions and the drawings.
   B. All joints between the framing and the building structure shall be sealed to secure a water-tight installation. Head sections of storefront shall accommodate ¼” deflection of structure. Provide expansion / construction of installed system. Provide wegos as required to ensure positive drainage of water to the exterior.
   C. After installation, all exposed aluminum surfaces shall be protected from damage.
   D. All sills shall be set in a continuous bed of sealant.
   E. Installation shall be in accordance with manufacturer’s standard windload charts. Members shall be sized utilizing windloads @ 15 PSF up to 40 feet and 20.2 PSF for 40 to 60 feet.

END OF SECTION
087100 DOOR HARDWARE

1. GENERAL:

A. Scope:

(1) Section Includes: Furnish and install Door Hardware as shown on Drawings and as specified herein, unless specifically excluded and specified in other Sections.

B. Definitions:

(1) Door Hardware includes items known commercially as builders hardware which are required for swing, sliding and folding doors, gates and miscellaneous items as indicated, except special types of unique and non-matching hardware specified in the same Section as the door and door frame. Types of items in this Section include, but are not necessarily limited to, the following:

C. System Description:

(1) General Requirements: While the Hardware Schedule is intended to cover doors and other movable parts of the building and establish a type and standard of quality, examine drawings and specifications and furnish proper hardware for openings whether listed or not. Hardware must meet applicable handicapped access standards, ordinances and codes. Omissions or corrections in hardware groups shall be brought to the attention of the Architect prior to bid opening. No extras will be allowed for omissions, changes or corrections necessary to facilitate proper installation.

(2) If an item is not specified but will be required in a similar situation, furnish equal hardware to that specified for similar locations if practicable. If no similar location is specified, then use hardware in keeping with that specified.

(3) The Work of this Section shall be the total responsibility of one firm herein identified as the Supplier/Installer. If the Supplier and Installer are not one firm then the Supplier shall be the responsible party and shall cover the complete coordination of related work in other Sections.

D. Submittals:

(1) General: Submittals requirements are specified in Section 01300 Shop Drawings and Samples.
(2) Materials List: As soon as practical after award of contract, submit a complete listing of materials to be furnished. Submit in quantities as directed by the Architect, showing each item proposed for installation use and quantities to be furnished. Supplier/installer bidders shall state in their bid the delivery date to Contractor.

(3) Product Data: Submit manufacturer's technical information for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and maintenance of operating parts and finish.

(4) Hardware Schedule: Submit final hardware schedule in manner indicated below. Hardware schedules are intended for coordination of work. Hardware schedule shall include a summary of individual items of hardware and related material used on the project, complete with the name of the manufacturer of each item. The Hardware Schedule shall be prepared in vertical format.

a. Final Hardware Schedule Content: Based on builders hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
   1) Catalog number, type, style, function, size and finish of each hardware item.
   2) Name and manufacturer of each item.
   3) Fastenings and other pertinent information.
   4) Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
   5) Explanation of abbreviations, symbols, codes, etc. contained in schedule.
   6) Mounting locations for hardware.
   7) Door and frame sizes and materials.
   8) Keying information.
   9) Any other pertinent data.

b. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by builders hardware, and other information essential to the coordinated review of hardware schedule.
(5) Samples: When requested by the Architect, prior to submittal of the final hardware schedule and prior to final ordering of hardware, submit one sample of each type of exposed hardware unit, finished as required, and tagged with full description for coordination with schedule. Samples will be returned to the supplier/installer. Units which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.

(6) Templates: Supply templates to door and frame manufacturers, as required, to enable proper and accurate sizing and locations of cut-outs for hardware and door reinforcement. Delivery of templates shall be timely to prevent delays in construction.
   a. Shipment of hardware prepaid to manufacturers requesting that hardware be incorporated in their work.
   b. Where cylindrical locks are used in hollow metal doors, furnish lock information to the door manufacturer for reinforcing in the door at the time of manufacture.

E. Quality Assurance:

(1) Qualifications:
   a. Manufacturer: Obtain each kind of hardware (latch and lock sets, hinges, closers, etc.) from only one manufacturer, although several may be indicated as offering products complying with requirements. Manufacturer shall have five years experience in manufacture of comparable hardware.
   b. The hardware consultant shall be, on a full-time basis, a regular member of the Door and Hardware Institute (DHI) and a registered Architectural Hardware Consultant (AHC) to properly detail work, order and supervise installation.
   c. The supplier/installer shall be a recognized architectural finish hardware supplier/installer who has been furnishing hardware within a 300 mile radius of the project for a period of not less than five years, and who is, or employs an experienced hardware consultant who shall be available to the Owner, Architect and Contractor at reasonable times during the course of the work for consultation about the project’s hardware requirements. The supplier/installer shall also be a factory authorized distributor for the items specified.
(2) Regulatory Requirements:
   a. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and national or 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.
   b. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors UL or FM labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware”.
   c. Comply with other applicable fire, handicapped and building codes, guidelines and regulations. Hardware supplied and installed shall meet the requirements of Arizona Revised Statutes, Title 34 Handicapped Requirements.

(3) Certifications: At the completion of installation, certify that material is properly installed, according to manufacturer's printed instructions. Submit certification in duplicate to the Architect after installation of hardware in accordance with Section 01700 Project Close-out.

F. Delivery, Storage and Handling:
   (1) Packaging of hardware is the responsibility of the supplier/installer. As material is received by the hardware supplier/installer from the various manufacturers, sort hardware as necessary. Deliver hardware in original and individual containers, complete with necessary fastenings, keys, instructions and templates for spotting mortising tools. Items particular to a specific door shall be clearly marked by door number and heading number on the package.
   (2) The hardware supplier/installer shall inventory hardware and verify that the count is correct. Each carton of hardware shall be marked with item numbers, corresponding to the item numbers on the Finish Hardware Schedule.
   (3) Provide secure lock-up for hardware delivered to the project, but not yet installed. Control and 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. Store materials off the ground in dry, protected areas.
(4) The Contractor shall tag and index keys, manuals, schematics, operating instructions and factory diagrams for release and use by the Owner.

(5) Containers holding keyed locks and cylinders shall be marked with the following:
   a. Heading Number
   b. Door Number
   c. Hand of Door (when required)
   d. Key Symbol

G. Maintenance:

(1) Provide Owner with manufacturer's parts list and maintenance instructions for each type of hardware supplied, including necessary wrenches and tools required for proper maintenance and adjustment of hardware, as supplied with hardware when shipped to General Contractor. The General Contractor shall gather parts lists, tools, etc. as supplied with the hardware at the time of installation and hold these items until close-out.

(2) Tools for Maintenance: Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance, and removal and replacement of builders hardware.

(3) Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Hardware Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.

(4) Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware. The supplier /installer shall not be responsible for adjustments, corrections or replacements due to abuse, vandalism of lack or required maintenance by the Owner on the hardware.
2. MATERIALS:

A. Manufacturers:

(1) Acceptable Manufacturers:
   b. Geared Hinges: Ives, Roton, Pemko.
   c. Locksets: Schlage.
   d. Cylinders/Cores: Schlage.
   e. Exit Devices: Von Duprin, Ives VR pulls.
   f. Closers: LCN.
   g. Over Head Stop/ HOLDERS: Rixson, Glynn Johnson.
   h. Threshold, Door bottom, Seals: National Guard, Pemko, Reese.
   i. Stops, Kickplates: Ives, Trimco, Rockwood.
   j. Pull, Push Plates, Misc.: Ives, Trimco, Rockwood.
   k. Key Cabinet: Lund, Telkee.

B. Hardware:

(1) Scheduled Hardware: Requirements for design, grade, function, finish, size and other distinctive qualities of each type of builders hardware is indicated in the Builder’s Hardware Data Sheet and Hardware Schedule at the end of this Section. The drawings show the direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of the door movement as shown. Products are identified by using hardware designation numbers of the following:

   a. Manufacturer's product designations: One or more manufacturers are listed for each hardware type required. Provide either the product designated, or, where more than one manufacturer is listed, the comparable product of one of the other manufacturers which comply with requirements including those specified elsewhere in this section.

   (2) Fasteners: Manufacture hardware 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.
a. Furnish necessary screws, bolts or other fastenings of suitable size and type to anchor the hardware in position for heavy use and long life, and of compatible material and finish. Furnish fastenings with anchors according to the material to which it is applied, and as recommended by the manufacturer. Fasten closers on wood or mineral core doors with hex nuts and bolts.

b. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed in surfaces of other work, to match the finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

c. Provide concealed fasteners for hardware units which are exposed when the door is closed, except to the extent no standard units of the type specified are available with concealed fasteners.

(3) Finish: Hardware shall be BHMA-626 (US26D) unless noted otherwise.

C. Hardware Types:

(1) Hinges

a. Geared Hinges: Type as listed in hardware sets.

b. Shall conform to the applicable requirements of Specifications FF-H-116, except as otherwise specified herein. Loose pin hinges for reverse-bevel doors with locks shall be constructed in a manner that will eliminate removal of the pins when the doors are in the closed position. Determine correct clearance from the drawings. Provide non-removable pins on all doors. Provide five knuckle, concealed ball bearing hinges on all doors. Flat Button, top and bottom tips required on all butt hinges. Match existing size where doors or frames are being reused.

1) Butt Hinge Length:

<table>
<thead>
<tr>
<th>Door Thickness</th>
<th>Door Width</th>
<th>Hinge Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 3/4&quot; door</td>
<td>Where Req.</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>1 3/4&quot; door</td>
<td>to 38&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>1 3/4&quot; door</td>
<td>over 38&quot; to 48&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td>1 3/4&quot; door</td>
<td>over 48&quot;</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

2) Number of Butt Hinges Required:

aa) Doors 60" high and under: 2 butt hinges
bb) Doors over 60" high and not over 90" high: 3 butt hinges
cc) Doors over 90" high and not over 120" high: 4 butt hinges

3) Hinge Types: Shall conform to the applicable requirement of Specification FF-H-121c, except as specified otherwise herein.
   aa) Interior doors: 5BB1
   bb) Exterior doors: 5BB1

(2) Door Locks:
   a. Shall conform to the applicable requirements for Series 161 of Specification FF-H-106, except as otherwise specified herein. The series selected shall, as far as practicable, be used throughout the project. All lock and latch sets of a series shall be the products of a single manufacturer. Lock cylinders shall have not less than six pin tumblers. Accessories such as door coordinators shall conform to the applicable requirements of Specification FF-H-106a (1). Lock and latch design, style and application shall meet handicapped access standards and codes where applicable.
   b. All locksets to be heavy duty. Cylindrical Type: Schlage “ND” Rhodes design or as listed in hardware sets. Functions as listed in hardware sets.
   c. Provide locks and latchsets with 2-3/4" backset, unless otherwise noted. Provide strikes with extended lip where required to protect trim from being marked by latch bolt. Provide at wood frames and/or wood doors (when in pairs) wrought boxes.

(3) Door Closers:
   a. Door closers shall meet handicapped access standards and codes. Complying with ANSI A117.1 for door opening force and delayed action closing.
   b. Surface mounted LCN 4041 Series 689 Finish, spray to match other hardware, with three (3) separate control valves (including back check), ANSI Grade I. Closers to be equipped with size adjustment (1 thru 6). All closers shall be mounted on the inside of the room wherever possible. Where parallel arm closers are used extra duty (EDA/CUSH) arms shall be used.

(4) Kickplates: Shall be .050 (minimum) stainless steel 12 inches high, by 1 ½" inches less than door width for single doors and one inch less
than the width for double doors. Finish, 630.

(5) **Stops and Bumpers:** Wall type WS401/WS402 series with proper anchor selected for substrate. Floor stops FS18S shall be used on exterior doors where required.

(6) **Silencers:** Supply 3 each at jambs of single doors and 2 each at pairs of doors.

(7) **Flush Bolts:**
   a. Flush bolts: Type FB458 series as required.
   Furnish flush bolts with dust proof strikes DP2, not required when used with thresholds.

(8) **Weatherstrip and Seals:**
   a. Door Bottoms shall be Type 600A or as listed in hardware sets.
   b. Weatherstrip shall be Type 160S or as listed in hardware sets.

(9) **Thresholds:** Shall be type 425 or as detailed on plans or listed in the Hardware Sets.

(10) **Push Plates:** Shall be .050 thick (minimum), 6 x 16 type 8200 finish 630 all edges beveled or as listed in hardware sets.

(11) **Pull Plates:** Shall be .050 thick (minimum), 6 x 16, edges beveled, Type 8302-10. Mount with thru-bolts, or as listed in hardware sets. Solid material finish 630.

D. **Hardware Finishes:**

(1) Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer’s standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.

(2) Provide finishes which match those established by BHMA or, if none established, match the Architect's sample.

(3) Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with
manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

(4) Provide protective lacquer coating on exposed hardware finishes or brass, bronze and aluminum, except as otherwise indicated. The suffix ".NL" is used with standard finish designations to indicate "no lacquer".

(5) The designations used in schedules and elsewhere to indicate hardware finishes are those listed in "Materials & Finishes Standard 1301" by BHMA, including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

E. Lock Cylinders and Keying:

(1) General: All doors this project shall be master keyed as directed by owner. Supplier shall meet with Owner to finalize keying requirements and obtain final instructions in writing. Use Schlage IC Cores, No Substitutions.

(2) Provide construction keying at all doors. Permanent keys shall not be under any circumstance made available to the General Contractor. Furnish 6 construction keys to the Contractor.

(3) Comply with Owner's Instructions for master keying and, except as otherwise indicated, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.

(4) Key Quantity: Furnish 3 change keys for each lock; 6 master keys for each master system.

3. INSTALLATION:

A. Examination:

(1) Prior to hardware installation, the supplier/installer shall examine the hollow metal door frames and other surfaces to receive hardware for accuracy of installation and alignment. The supplier/installer shall report in writing to the Contractor with a copy to the Architect, of detrimental conditions. Failure to perform this requirement constitutes a waiver to subsequent claims to the contrary and holds the supplier/installer responsible for corrections the Architect may require. Commencement of Work shall be construed as acknowledgment by the supplier/installer that doors and frames and other surfaces to receive hardware are in compliance with the requirements of the Contract Documents.
B. Preparation:

(1) The supplier/installer shall meet with the Owner, Architect, and related trades prior to the Commencement of Work. Tag items or packages with identification related to the final hardware schedule, and include basic installation instructions in the package.

(2) Deliver hardware items at the proper times to the proper locations (ship to project site) for installation.

C. Installation:

(1) Install each hardware item in compliance with the manufacturer's instructions and recommendations.

(2) Mount hardware units at heights as recommended per SDI-100, except as specifically indicated or required to comply with governing regulations, and except as may be directed otherwise by Architect.

(3) Application of Hardware: Hardware shall be installed in a neat, workmanlike manner following the manufacturer's instructions. Fasteners, supplied with the hardware, shall be used to secure the hardware in place. Wood screws shall be used for securing hardware to wood surfaces. Machine screws, set in expansion shields, shall be used for securing hardware to concrete or masonry surfaces. Thru-bolts shall be used where specified or where necessary for satisfactory installation.

(4) Install each hardware item in compliance with the manufacturer's instructions and recommendations. 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 protection with finishing work specified in Division 9. Do not install surface-mounted items until finishes have been completed on the substrate. The Supplier/Installer shall be responsible for correct application according to factory installation instructions.

(5) Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry.
(6) Deliver hardware items at the proper times to the proper locations (shop or project site) for installation.

D. Field Quality Control:

(1) Inspection: The supplier/installer shall provide a final inspection with the Owner, and Architect at the completion of the installation.

(2) After hardware is checked, keys shall be tagged, identified and delivered to the Owner by registered mail, or delivered in person after receiving a signed receipt from a responsible representative of the Owner. Errors in cutting or fitting, or damage to adjoining work shall be repaired, as directed.

E. Adjusting:

(1) Check and adjust each operating item of hardware and each door, to ensure proper operation or function for each unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

(2) 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 hardware items in such space or area. Adjust door control devices to compensate for final operation of heating and ventilating equipment. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

F. Cleaning:

(1) Insure that after installation, the materials furnished and installed will be free of paint or lacquer as may appear from the Work of other subcontractors. Clean operating items as necessary to restore proper function and finish of hardware and doors.

(2) During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of away from premises. Leave Work in clean condition in accordance with Section 01500 Temporary Facilities.

G. Protection:

(1) After application, hardware shall be protected from paint, stains,
blemishes and damage until acceptance of the Work.

H. Hardware Schedule:

(1) While the following hardware sets are intended to cover doors and establish a type and standard of quality, it shall be the specific duty and responsibility of the hardware supplier to examine the drawings and specifications and furnish proper hardware for openings. The hardware supplier shall compare the specifications with the door schedule and notify the Architect of errors, inconsistencies or omissions during the bid period.

Acceptable Manufacturers:

- Hinges: Ives, McKinney, Stanley
- Locksets: Schlage
- Cylinders/Cores: Schlage
- Exit Devices: Von Duprin
- Closers: LCN
- Over Head Stop/Holders: Rixson, Glynn Johnson
- Thresholds, Door bottom, Seals: National Guard, Pemko, Reese
- Door Trim, Stops, Kickplates: Ives, Trimco, Rockwood
- Gate Hardware: Hoover Fence Company

HARDWARE GROUP NO. 1

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<thead>
<tr>
<th>QTY</th>
<th>DESCRIPTION</th>
<th>CATALOG NUMBER</th>
<th>FINISH</th>
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<tbody>
<tr>
<td>1</td>
<td>MORTISE CYLINDER</td>
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<td>SCH</td>
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<td>FSIC CORE</td>
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<td>626</td>
<td>SCH</td>
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<tr>
<td></td>
<td>ALL REMAINING</td>
<td>HARDWARE BY DOOR MANUFACTURER</td>
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## HARDWARE GROUP NO. 2

**111B**

Provide each SGL door(s) with the following:

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<th>DESCRIPTION</th>
<th>CATALOG NUMBER</th>
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<th>MFR</th>
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<tbody>
<tr>
<td>4</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5 NRP</td>
<td>630</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>VANDL STOREROOM LOCK</td>
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<td>23-030 (GMK, F)</td>
<td>626</td>
<td>SCH</td>
</tr>
<tr>
<td>1</td>
<td>LOCK GUARD</td>
<td>LG1</td>
<td>630</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>OH STOP &amp; HOLDER</td>
<td>90H</td>
<td>630</td>
<td>GLY</td>
</tr>
<tr>
<td>1</td>
<td>KICK PLATE</td>
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<td>630</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>DRIP CAP</td>
<td>16A</td>
<td>A</td>
<td>NGP</td>
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<tr>
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<td>SEALS</td>
<td>160S</td>
<td>AL</td>
<td>NGP</td>
</tr>
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<td>DOOR SWEEP</td>
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<td>CL</td>
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<td>THRESHOLD</td>
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## HARDWARE GROUP NO. 3

**203**

Provide each SGL door(s) with the following:

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<th>CATALOG NUMBER</th>
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<td>HINGE</td>
<td>5BB1 4.5 X 4.5 NRP</td>
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<td>SCH</td>
</tr>
<tr>
<td>1</td>
<td>KICK PLATE</td>
<td>8400 10&quot; X 2&quot; LDW B-CS</td>
<td>630</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>WALL STOP</td>
<td>WS401/402CCV</td>
<td>626</td>
<td>IVE</td>
</tr>
<tr>
<td>3</td>
<td>SILENCER</td>
<td>SR64</td>
<td>GRY</td>
<td>IVE</td>
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## HARDWARE GROUP NO. 4

**204 205**

Provide each SGL door(s) with the following:

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<th>CATALOG NUMBER</th>
<th>FINISH</th>
<th>MFR</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>HINGE</td>
<td>5BB1 4.5 X 4.5 NRP</td>
<td>652</td>
<td>IVE</td>
</tr>
<tr>
<td>1</td>
<td>ENTRANCE LOCK</td>
<td>ND53PD RHO</td>
<td>626</td>
<td>SCH</td>
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<td>WALL STOP</td>
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<tr>
<td>3</td>
<td>SILENCER</td>
<td>SR64</td>
<td>GRY</td>
<td>IVE</td>
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</table>

END OF SECTION
088000 GLAZING

1. SCOPE:

   Furnish all labor, equipment, and material required for the complete installation of all glass and glazing.

2. MATERIALS:

   A. Glass, factory labeled, each panel, and not removed until final cleaning. Pittsburgh, Viracon, St. Gobain, P.P.G., Guardian or equal.


   C. Interior Fixed Glass: ¼” clear, tempered where required.


3. INSTALLATION:

   A. Glazing: Per Glazing Manual of Plate Glass Jobbers Association and plan details.

   B. Cleaning: Remove excessive glazing compound. General cleaning by General Contractor.

   C. Breakage: All glass breakage shall be the responsibility of the Contractor until the work has been completed and the contract fully performed.

   END OF SECTION
   END OF DIVISION
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DIVISION 9 – FINISHES

092216 NON-STRUCTURAL METAL FRAMING

1. SCOPE:
   A. Include all labor, materials and equipment necessary for a complete installation as shown or specified.
   B. Install all materials in accordance with manufacturer's requirements.
   C. Related Sections: All work in this section shall be coordinated with the following sections:
      (1) 092900 Gypsum Board

2. MATERIALS:
   A. Manufacturer: Milcor, Keene, Western Metal, or approved equal.
   B. Wall track at ceiling and floor shall be 20 gage, as detailed, hot dipped galvanized steel with not less than 1-1/4" flanges and of proper width for studs selected.
   C. Studs shall be 20 gage, as detailed, hot dip galvanized steel. Webs shall be pre-punched at 24" o.c. Contractor shall consult manufacturer's limiting height tables and shall adjust gauge as necessary to be in conformance therewith.
   D. Resilient Furring Channels: RC-1.
   E. Metal Furring Channels: DWC-25 or DWC-20 as required.
   F. 1-1/2" x 16 gauge cold rolled channels.
   G. 1-1/2" x 12" gauge cold rolled channels.
   H. Furring Channel clips.
   I. 8 gauge galvanized tie wire.
   K. Additional accessories, clips, braces, etc. as may be required by the manufacturer.
L. Acoustical Sealant

   (1) Non-hardening, non-drying, non-bleeding, synthetic rubber-based material conforming to ASTM D-217.

3. INSTALLATION:

A. Attach framing securely to building structure. Fasten partition track at 2'-0" o.c. in accordance with manufacturer’s requirements. Use fasteners suitable for material track is fastened to. The use of powder driven anchors is allowed if installed with minimum 1" long shot pins (.145 shank size) used with the correct load. Set partition track in a continuous bead of sealant.

B. Provide double 20 gauge studs at all openings anchor to structure above, in accordance with the details shown in the drawings. Integ rally reinforce.

C. Maximum stud spacing shall be 16" o.c.

D. Coordinate with other trades for provisions for blocking, metal backing plates, special anchors, etc.

E. Install all components and accessories in strict accordance with the manufacturer’s recommendations.

F. Some partitions extend to the bottom of the structure above. Refer to drawings. Provide for expansion and deflection of the building structure as recommended by the manufacturer.

G. Provide 16 gauge studs and solid 2x fire treated wood blocking at all walls supporting shelving or cabinets.

H. Provide channel bracing at mid-height of all walls, or at 6'-0" o.c. vertically where walls exceed 12'-0" in height. Minimum 3/4" cold rolled channel with clips at each stud.

I. Framing of Intersections:

   (1) Provide three studs or floating stud at all exterior and interior corners.

   (2) Provide floating corner at ceiling/wall intersections, except at fire rated walls.
J. Provide acoustical sealant around entire perimeter of sound rated partitions.

K. Provide 3 beads sealant. One at the center of the floor or ceiling track and end wall studs, one at the edge of gypsum wallboard at each face.

L. Caulk perimeter of all electrical junction boxes, and pipe penetrations. Coordinate with fire stopping requirements.

M. Separate and recycle waste materials to the greatest extent possible.

END OF SECTION
092900 GYPSUM BOARD

1. GENERAL:
   A. The Contractor shall furnish all labor and materials to render a complete gypsum wallboard system installation.
   B. Submit painted sample of finish texture on 24" x 24" piece for approval prior to commencing work. Finish level shall be Gypsum Association Level 3 on all walls except those receiving graphics. Walls receiving graphics shall have a Level 5 Finish Level.
   C. Related Sections: All work described in this Section shall be coordinated with the following Sections:
      (1) Section 092216: Non-structural Meal Framing
   D. Reference Standards:

2. MATERIALS:
   A. Gypsum Wallboard:
      (1) Typical: 5/8" thick, Type 'X', ASTM C-36, SW tapered edges.
      (2) Wet Locations: 5/8" thick, Type 'X', moisture and fire resistant wallboard, mold resistant and paperless, complying with ASTM C1178C and 1178M: National Gypsum Gold Bond eXP Tile Backer, Georgia Pacific DensShield Tile Backer, Certainteed M2 Tech Moisture and Mold Resistant Gypsum Board or similar.
   B. Gypsum Sheathing: 5/8" DensGlass Gold or equal
   D. Sound Board: ½” Homasote 440 Sound Barrier
   E. Wallboard Casings: (galvanized)
      (1) Corner bead: #800 Durabead
Vail Mechanic Shop Expansion
Vail Unified School District

(2) "L" metal edge trim #200-B
(3) "U" metal edge trim #200-A

F. Screws: 1-1/4" Type "S" Buglehead.
G. Tape and Cement: Approved manufacturer's materials.
H. Texture: Light hawk and trowel

3. INSTALLATION:

A. Walls: Apply board, in maximum practical lengths, perpendicular to framing with ends occurring over firm bearing, end joints staggered ½ panel, field bearings screwed at 12" centers (5 per 48" width). End bearings screwed on 6" centers. Start at center of boards and work toward ends. Provide full panels over doors, no joints permitted.

B. Screw apply casings per manufacturer's directions and install at all outside edges and at intersections with dissimilar materials.

C. Wallboard panels shall be installed continuous over openings and extend at least one (1) full stud beyond the opening edge.

D. Wallboard corners shall overlap utilizing floating corner and floating stud techniques, as required, with no gaps under corner bead. Corner bead shall be attached with screws, crimping is not permitted.

E. Tape, cement, and sand wallboard surfaces. Apply thin cement layer, set tape into cement, let dry for 24 hours, and sand joints, texture entire area to uniform finish.

F. Complete installed system shall conform to all manufacturer's requirements for support size and spacing and lateral bracing.

G. Separate and dispose of and/or recycle gypsum products to the greatest extent possible.

END OF SECTION
095113 SUSPENDED ACOUSTICAL CEILING

1. GENERAL:
   A. Scope: Furnish all necessary materials, labor, and equipment for the complete installation of a suspended system.
   B. Upon completion of the work, furnish owner with 20 tiles for future maintenance.
   C. Related Section 092900 Gypsum Wallboard.
   D. Submit samples of grid and panel material as well as manufacturer literature in accordance with Section 013000.

2. MATERIALS:
   A. Suspension System:
      (1) Exposed grid, Prelude XL as manufactured by Armstrong CLG Systems for 2x4 grid. Components shall have 5/16" exposed capped face and be “intermediate duty”. Main beams item no. 7300 (12 feet long).
         Cross Tee: Item no. XL7342 (48”)
         Item no. XL7328 (24”)
         Wall moldings: Item no. 7800 (12 feet long)
      (2) Color: White
      (3) Hanger Wire: 12 gage, galvanized.
   B. Acoustical Materials:
      (2) Equal products by USG, Armstrong or prior approved equal.

3. INSTALLATION:
   A. Furnish and install all framing for suspended ceilings in accordance with manufacturer’s directions.
B. All components, fastenings, and methods shall be selected for the actual ceiling loading and the specific structural conditions. Size to prevent deflection in excess of 1/360th of the span of any member.

C. Surface shall be level and true to 1/8" tolerance in 10 feet.

D. Finished work shall be free from dirt, discoloration, defects or objectionable variation in color.

E. Install continuous edge molding at all edges where tile intersects walls.

END OF SECTION
096513 RESILIENT BASE AND ACCESSORIES

1. GENERAL

A. Scope: Furnish all necessary materials, labor and equipment for the complete installation of rubber base and vinyl composition tile as indicated on the drawings.

B. Maintenance Materials: Upon completion of the work, furnish Owner with 10 linear feet of base for future maintenance.

C. Submittals:

(1) Submit product data and samples.

2. MATERIALS

A. Rubber Base: Base shall be 4" cove, 1/8" thick type 700 Series TPR rubber compound by Roppe, Flexco, Johnsonite or approved equal. It shall be constructed of 10% post-industrial waste, and shall be smooth and free from imperfections which detract from its appearance. The base shall conform fully to the requirements of Standard Specification F-1861, Group 1 (solid). Use pre-molded outside corners. Color as selected by the Architect.

B. Reducer Strips: Roppe, Flexco or Johnsonite. Color to be selected by Architect.

C. Adhesives: All resilient flooring and cove base shall be installed using Envirotec Healthguard series adhesives as manufactured by W.F. Taylor Co., Inc., Santa Fe Springs, CA; Chicago, IL; Dalton, GA approved equal, or as recommended by the manufacturer.

Adhesives shall be non-toxic, low odor and solvent free with no alcohol, glycol, or ammonia. Adhesives shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials per OSHA Regulation 29 CFR 1910-1200.

Compatibility of W.F. Taylor Envirotec Healthguard adhesives with specified floor covering shall be warranted by W.F. Taylor Company. A written letter of guarantee shall be obtained by Contractor prior to installation of flooring products. Letters of guarantee are required to accompany all flooring submittals.
3. INSTALLATION

A. Rubber Base:

   (1) Install per Asphalt and Vinyl Tile Institute Specifications and manufacturer's directions. Commencing work by this Contractor indicates acceptance of surfaces. Use pre-molded outside corners. Miter inside corners. Minimum length of any run of base shall be 48”.

   (2) Install rubber base at all walls and cabinets.

B. Provide reducer strips at all flooring transitions.

C. Separate and recycle waste materials to the greatest extent possible.

END OF SECTION
1. GENERAL

A. SUMMARY
   
   (1) Section includes modular carpet tile.

B. PREINSTALLATION MEETINGS
   
   (1) Preinstallation Conference: Conduct conference at Project site.

C. ACTION SUBMITTALS
   
   (1) Product Data: For each type of product indicated.
   
   (2) Samples: For each exposed product and for each color and texture specified.

D. INFORMATIONAL SUBMITTALS
   
   (1) Product test reports. Including, but not limited to:
       a. ASTM 5252 hexapod test results for carpet tile only.
       b. Flame spread characteristics.
       c. VOC content.
   
   (2) Sample warranty.
   
   (3) Installer qualifications.

E. CLOSEOUT SUBMITTALS
   
   (1) Maintenance data.
   
   (2) As-Built color and material schedule for each carpet installed, including:
       a. Descriptive location.
       b. Manufacturer.
       c. Carpet type (name and number).
       d. Color, style, and pattern (name and number).
       e. Manufacturer’s recommended cleaning procedures.
       f. Warranty provisions.
F. QUALITY ASSURANCE

(1) Manufacturer Qualifications: Demonstrate at least 5 years successful performance with similar products and installations.

(2) Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level. Installer must demonstrate at least 5 years successful performance with similar installations.

(3) Fire-Test-Response Ratings: Provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.

G. DELIVERY, STORAGE, AND HANDLING

(1) Comply with CRI 104.

H. FIELD CONDITIONS

(1) Comply with CRI 104 for temperature, humidity, and ventilation limitations.

I. WARRANTY

(1) Carpet Tiles:
   a. Installation Warranty: 2 years from the date of Substantial Completion, signed by the contractor and installer for the repair or replacement of defective materials and workmanship.
   b. Manufacturer’s Warranty: 10 years from the date of Substantial Completion. Warranty shall be non-prorated and cover the following:
      1. Delamination: the backing will not delaminate for the life of the carpet.
      2. Edge Ravel: the carpet will not have continuous ends coming out at lengthwise seams for the life of the carpet.
      3. Tuft Bind: the carpet shall have an average face yard tuft bind of 19 pounds for the life of the carpet.
      4. Static: the carpet will not hive static discharges in excess of 3.5 kV when tested under AATCC Test Method #134-1979 for the life of the carpet.
      5. No more than 10% loss of pile by weight.
6. No zippering.
7. Chair pads must not be required to maintain the warranty.

2. PRODUCTS
A. CARPET TILE
   (1) CPT1: Hybrid Tile 59580 by Shaw Contract; color “Water” 64485
B. INSTALLATION ACCESSORIES
   (1) Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
   (2) Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

3. EXECUTION
A. INSTALLATION
   (1) Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
   (2) Proceed with installation only after unsatisfactory conditions have been corrected.
   (3) Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer’s written installation instructions for preparing substrates indicated to receive carpet tile installation.
   (4) Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer’s written installation instructions.
   (5) Installation Method: As recommended in writing by carpet tile manufacturer. Install tiles in ashlar method.
(6) Maintain dye lot integrity. Do not mix dye lots in same area.

(7) Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

(8) Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

(9) Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

(10) Install pattern parallel to walls and borders.

(11) Perform the following operations immediately after installing carpet tile:
   a. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
   b. Remove yarns that protrude from carpet tile surface.
   c. Vacuum carpet tile using commercial machine with face-beater element.

(12) Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION
099000 PAINTING

1. SCOPE:

   A. Paint all surfaces not factory pre-finished, interior and exterior.

   B. Regulatory requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

   C. Maintenance Materials:

      (1) Contractor shall furnish to the Owner one (1) full gallon of each color and each finish.

      (2) Containers shall be sealed tight and clearly labeled for identification.

      (3) Maintenance material shall be new material, not opened or used material.

   D. Submittals:

      (1) All materials submitted for approval must be accompanied by product information showing raw material composition.

      (2) Contractor shall submit paint chips for color and texture selections. Three sets to the Architect for approval.

      (3) When requested by the Architect, the Contractor shall submit a 12 inch by 12 inch sample of any paint finish. Paint finish sample shall be applied to identical type of materials to which it will be applied on the job. Identify samples with color name and number and location on the job.

      (4) Paint colors shall be selected by Architect.

   E. Delivery, Storage and Handling:

      (1) All materials shall be delivered to site in manufacturer's unbroken sealed containers. Each container shall be labeled by the manufacturer giving manufacturer's name, type of paint, label analysis, color and instruction for mixing and reducing.
(2) Provide adequate storage facilities. Store paint materials at minimum ambient temperature of 45E F.

(3) Take precautionary measures to prevent fire hazards and spontaneous combustion.

F. Environmental conditions:
   (1) Surfaces to receive paint materials shall be dry.
   (2) Minimum application temperature for latex paints is 45E F.

G. Protection:
   (1) Adequately protect surfaces not being painted. Repair or replace all items and surfaces damaged as a result of inadequate protection.
   (2) Place waste which may constitute a fire hazard in closed metal containers and remove daily from site, or more often, if required.
   (3) Remove electrical plates, surface hardware, fittings and fastenings prior to painting. These items shall be stored, cleaned and replaced on completion of work in each area. Solvent used to clean hardware shall not remove permanent lacquer finish.
   (4) Provide "WET PAINT" signs to protect newly painted surfaces.
   (5) At the completion of work of other trades, touch up and restore damaged painted surfaces interior and exterior.

H. Painting at Patched Areas:
   (1) Painting at patched and repaired areas designated on the drawings will be limited to the immediate repaired area and extend two feet beyond the repair in all directions unless noted otherwise. Paint color shall match as closely as possible existing colors.

2. MATERIALS:

   A. The following manufacturer's top-of-the-line, first quality products are acceptable. If use of equal products manufactured by others is desired, a list of proposed products including technical brochures shall be submitted for prior approval. Contractor will furnish to the Architect manufacturer's numbered invoices showing material types and quantities used on this project.
(1) Dunn-Edwards Corp.

(2) Sherwin-Williams

(3) ICI

(4) Frazee

B. Manufacturer's catalog names and number of paint types in this Section are based on products of Dunn Edwards and is the standard of quality against which the Architect will judge equivalency. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc and the purity of acrylic materials are some of the criteria which will be used by the Architect in evaluating the equivalency of submitted materials. No lead shall be utilized in the composition of any paint products.

3. INSTALLATION:

A. Workmanship: Preparation, application, workmanship, completion, and acceptance in accordance with manufacturer's recommendations and applicable provisions of "Painting Specification Manual" by P.D.C.A. for Type 1 Standard Job.

B. Preparation of Surfaces:

(1) Wood: Sandpaper to a smooth and even surface and then dust with a cloth dampened with turpentine in order to completely remove all traces of sanding particles. Nail holes puttied, knots or pitch pockets sealed with shellac.

(2) Concrete: Thoroughly clean surfaces of all loose material land form release agents.

(3) Galvanized Metal: Thoroughly clean with solvent and prime with galvanized metal primer.

(4) Ferrous Metal: Scale and rust removed, cleaned, primed with rust-inhibitive metal primer.

(5) Back Priming: Exposed wood frames and trim, back-primed with one coat of Woodlife.

(6) General: Before painting, remove hardware, accessories, plates, lighting fixtures, and similar items or provide ample protection. Replace all items upon completion of the work.
(7) Where surfaces are to receive aliphatic or epoxy coatings, caulk joint between floor and wall and at all intersections of dissimilar materials.

(8) Previously Painted Surfaces: Wash with tri-sodium phosphate. Remove loose paint and rust and apply primer.

(9) Surface Wireways and Conduits: Sand surfaces to remove sheen. Prime with Versaprin. Apply final coats within 7 days.

(10) Exterior Metal:
    a. Power wash or power sand all areas to be painted, and use a mild detergent solution such as Mi-T-M SURFACE PREP, if required. Then rinse with clear clean water until all residue has been removed from all surfaces.

C. Application:

(1) Manufacturer's representative shall conduct a pre-painting conference to familiarize himself with the work and to verify the compatibility of all products with the substrates.

(2) The manufacturer's representative shall monitor the application of all aliphatic and epoxy coatings and shall provide certification, in writing, that the products have been installed properly.

(3) The application of any painting material on any surface shall constitute an acceptance by the Contractor of such surface.

(4) Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.

(5) Apply each coat at the proper consistency according to product manufacturer.

(6) All coats shall be thoroughly dry (minimum of 4 hours) before applying succeeding coats.

(7) All necessary repairing of nail holes, cracks, plaster, drywall, doors, etc., shall be done after the prime coat. Patch surface with material of same color as finish. Repairs shall be brought flush with and match adjacent surfaces.
(8) Where clear finishes are required, ensure tint fillers match wood. Work fillers well into grain before set. Wipe off excess.

(9) All edges of doors shall be finished same as the faces after fitting.

(10) Hot spots and suction spots noticeable after application of first coat shall be neutralized and touched up before applying second coat. The last coat shall produce an even result.

(11) Exposed piping, ductwork, conduits, and cable trays generally will be painted color and texture to match walls or ceilings next to it.

(12) Final color coat shall show full coverage regardless of number of coats specified.

(13) Paint all sheet metal and mechanical equipment exposed to view on roof as directed. Paint visible portions of flashings, asphaltic coatings, and cant strips to blend with wall surfaces.

(14) All metal work (doors, frames, handrails, etc) and millwork shall be sprayed.

D. Mechanical and Electrical Equipment:

(1) All exposed electrical conduit hangers, outlet boxes, junction boxes, galvanized covers, raceways, gutters, supporting frames, piping, ductwork, grilles, registers, etc. in rooms calling for paint shall be painted to match adjacent surface. Factory finished aluminum registers are to remain unpainted unless so noted.

(2) Remove grilles, registers, covers and access panels from location and paint separately. Clean the back surfaces of all foreign matter.

(3) Replace identification markings on mechanical and electrical equipment when painted or spattered.

(4) Fire pull levers and fire control boxes shall not be painted; if painted by accident, replace at no expense to the Owner.

(5) Sprinkler heads and smoke detectors shall not be painted. If painted, they shall be replaced.

(6) Paint interior of air ducts that are visible through diffusers and registers with one (1) coat of flat black paint to the limit of sight line.
(7) Paint exposed dampers to match face panels.

E. Cleaning:

(1) Remove paint where spilled, splashed, or spattered immediately.

(2) During progress of work, keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.

(3) Upon completion of work, leave premises neat and clean to the satisfaction of the Architect.

F. Paint Schedule:

(1) Paint schedule lists minimum coats. Additional coats may be required to obtain color and uniformity and to hide, at no additional cost to the Owner.

(2) Interior Work:

a. Interior Gypsum Drywall (typical):
   1 coat: Vinylastic Select (VNSL00), low-odor/zero-VOC interior latex prime
   2 coats: Spartazero Eggshell (SZRO30) Low Sheen, low-odor/zero-VOC interior latex low sheen paint

b. Interior Gypsum Drywall (at wet areas):
   1 coat: Vinylastic Select (VNSL00-1), low-odor/zero-VOC interior latex primer
   2 coats: Carboline Sanitile 255, Semi-Gloss, interior acrylic-epoxy eggshell paint

c. Interior Metal, Ferrous:
   1 coat: Bloc-Rust Premium (BRPR00-1-WH), interior/exterior waterborne alkyd rust-preventative metal primer
   2 coats: EverShield (EVSH50-3), low-odor / low-VOC interior/exterior acrylic semi-gloss paint

d. Interior Metal, Non-Ferrous:
   1 coat: Ultra-Grip Premium (UGPR00), acrylic multi-purpose primer
   2 coats: EverShield (EVSH50-3) low-odor / low-VOC interior/exterior acrylic semi-gloss paint
e. **Interior Wood:**
   1 coat: Inter-Kote Premium (IKPROO) Primer, low-odor/zero-VOC interior latex primer
   2 coats: Spartazero Eggshell (SZRO30) Low Sheen, low-odor/zero-VOC interior latex low sheen paint

(3) **Exterior Work:**

a. **Exterior Metal, Ferrous:**
   1 coat: Corrobar (43-5)
   2 coats: SynLustro (10) Alkyd

b. **Exterior Metal, Non-Ferrous:**
   1 coat: Versaprice (42-44)
   2 coats: SynLustro (10) Alkyd

END OF SECTION
END OF DIVISION
102813.14 ELECTRIC HAND DRYERS

PART 1 - GENERAL

1.1 CONDITIONS AND REQUIREMENTS

A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

A. Electric hand dryers.

1.3 RELATED SECTIONS

A. Division 26 - Electrical: Electrical systems and components.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300

B. Product Data: Provide construction details, dimensions, anchoring and mounting requirements, material and finish descriptions, electrical requirements, and manufacturer’s warranty.

C. Operation and Maintenance Data: Provide for electric hand dryers to include in maintenance manuals.

D. Warranty: Provide sample of manufacturer’s standard warranty for parts and labor.

1.5 QUALITY ASSURANCE


B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified testing agency, and marked for intended location and application.
1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle electric hand dryers in manufacturer’s protective packaging.

B. Store electric hand dryers off of ground, under cover, and in a dry location. Handle according to manufacturer’s written recommendations to prevent damage, deterioration, or soiling.

1.7 COORDINATION

A. Coordinate locations of electric hand dryers with other work to prevent interference with clearances required for access, and for proper installation, adjustment, operation, cleaning, and servicing of electric hand dryers.

1.8 WARRANTY

A. Manufacturer’s Standard Warranty: Manufacturer’s standard form in which manufacturer agrees to repair, restore, or replace defective electric hand dryer components and labor within specified warranty period.

1. Warranty Period: Five (5) years limited for labor and five (5) years for parts.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the electric Dyson Airblade V hand dryers manufactured by Dyson Inc., 1330 W. Fulton St., Floor 5, Chicago, IL 60607; 888-397-6622, www.dyson.com/Airblade or comparable product acceptable to the Architect.

B. Substitutions will be considered under provisions of Section 013345.

2.2 ELECTRIC HAND DRYERS

A. Electric Hand Dryers: The electric Dyson Airblade V Electric hand dryer (Model HU02); Item No. 307174-01 (sprayed nickel LV).

1. Mounting: Surface mounted on ABS/PBT plastic backplate/mounting bracket; protrudes four inches from wall, no recessing required; ADA compliant.


4. Filtration: 99.97 percent particulate efficiency HEPA filter with anti-microbial coating.

5. Operation: Touch-free capacitive sensor activation.
   a. Hand dry time: 12 seconds
   b. Airspeed at nozzle: 420 mph
   c. Operating Airflow: Up to 5.28 gal/sec.
   d. Rated Operating Noise Power: 79 db(A)

6. Motor: Dyson Digital Motor (DDM), V4 switched reluctance brushless DC type; 92,000 rpm motor speed; less than 0.5 watt standby power consumption.


8. Operating Temperature Range: 0 - 40 degrees C.

9. Standby Power Consumption: Less than 0.5 W.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Verify availability and characteristics of electrical power. Drill minimum two (2) inch diameter holes for electrical service entrance through backplate.

B. Do not begin installation until substrates are complete and ready for installation of electric hand dryers.

3.2 INSTALLATION
A. Locate and install mounting bracket in accordance with manufacturer’s written instructions. Use minimum 0.25-inch anchors to mount bracket. Mount electric hand dryer at height above finished floor recommended by manufacturer.

B. Install electric hand dryer in accordance with manufacturer’s written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer. Install electric hand dryers level, plumb, and firmly anchored in locations and at heights indicated.
3.3 CLEANING AND PROTECTION

A. Adjust electric hand dryers for smooth operation. Replace damaged or defective components.

B. Remove protective coverings from finished surfaces.

C. Clean exposed surfaces using materials and methods recommended by manufacturer.

END OF SECTION
DIVISION 22 - PLUMBING

220500 COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.1 RELATED WORK

A. General Conditions

B. Special Conditions

C. Supplementary General Conditions

D. Architectural, Structural, Civil, Electrical and Mechanical Drawings & Specifications

1.2 SCOPE OF WORK

A. The work covered by the Plumbing Sections of the Specifications shall include the furnishing of all materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of all mechanical and plumbing work required in the Contract Drawings.

B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified in this Section or work specified in other sections, it shall be the responsibility of the Contractor to provide all material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned or not.

C. The Contractor shall visit the premises and thoroughly familiarize himself with all the details of the work and working conditions and to verify all dimensions in the field. The Contractor shall advise the Architect of any discrepancy prior to bidding. The submission of bids shall be deemed evidence of the Contractor's site visit, the coordination of all existing conditions, and the inclusion of all considerations for existing conditions.

1.3 PLANS AND SPECIFICATIONS

A. These Specifications are accompanied by drawings of the building and details of the installations indicating the locations of equipment, piping, outlets, etc. The drawings and these specifications are complementary to each other, and what is required by one shall be as binding as if required by both.

B. If departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Architect for
review. No departures shall be made without prior written acceptance of the Architect.

C. The interrelation of the specifications, the drawings, and the schedules is generally as follows: The specifications determine the nature and setting of the materials, the drawings establish the quantities, dimensions, and details, and the schedules give the performance characteristics.

D. Should the drawings disagree in themselves or with the specifications, the contractor shall immediately notify the architect and shall perform and/or furnish the better quality or greater quantity of work or materials unless otherwise directed by the architect in writing. In case the specifications should not fully agree with the schedules, the latter shall govern. Figures indicated on drawings govern scale measurements and large scale details govern small scale drawings. In case of disagreement between specifications and drawings, see Division I of these specifications for clarifications.

E. Items specifically mentioned in the specifications but not shown on the drawings and/or items shown on the drawings but not specifically mentioned in the specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

1.4 QUALITY ASSURANCE

A. All work shall comply with the applicable rules of the following:

1. 2018 International Building Code
2. 2018 International Mechanical Code
3. 2018 International Plumbing Code
4. 2018 International Fire Code
5. 2018 International Energy Conservation Code
6. National Fire Protection Association Codes
7. State Fire Marshall
9. All applicable city, county, state, and federal rules, codes, and ordinances.
B. In any instance where these specifications call for materials for construction of a better quality or larger size than required by the codes, the provisions of these specifications shall take precedence. None of the terms or provisions of this specification shall be construed as waiving any rules, regulations, or requirements of these authorities. The codes shall govern in case of direct conflict between the codes and the Drawings.

1.5 SUPERVISION

A. A competent foreman or superintendent, initially approved by the Architect, shall be assigned to the project to receive instructions and to act for the Contractor. Once this superintendent has been approved, no change shall be made without approval of the Architect. Architect's authorized representative and/or owner's observer shall have the right to observe the work at any time. The Contractor shall have a representative present when his work is being observed, and he shall give assistance, as may be required, to the Architect's representative. Recommendations made by the observer shall be promptly carried out, and all unsatisfactory material and/or workmanship shall be replaced at once, to the satisfaction of the Architect.

1.6 GUARANTEE

A. The Contractor shall guarantee all materials and workmanship for a period of two (2) years after the final acceptance of work.

1.7 UTILITIES

A. The contract documents reflect the general location, size, and elevations of sewer line, location, size and pressure of water and other lines and manner of routing for all utilities known to be required on this project. It shall be the responsibility of the Contractor to visit the site, meet with the local utility companies in order to coordinate and confirm the exact requirements for each utility to provide a complete and operative system. The bid submitted by the Contractor shall include costs for all such utility company charges and/or fees.

1.8 BUILDING CONSTRUCTION AND LAYOUT OF WORK

A. It shall be the responsibility of the Contractor to consult the architectural and engineering drawings and details so as to thoroughly familiarize himself with the type and quality of construction to be provided on this project.

B. The Drawings are diagrammatic in character and cannot show every connection in detail or every pipe in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The 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 or above suspended ceilings, etc., in finished portions of the building, unless specifically noted or indicated to be exposed. Work shall be installed to avoid crippling of structural members; therefore, inserts to accommodate hangers shall be set before concrete is poured, and proper openings through floor, walls, beams, etc., shall be provided as hereinafter specified or as otherwise indicated or required before concrete is poured. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted.

C. The approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details in regard to location. Exact locations are to be determined by actual measurements at the building and will in all cases be subject to the approval of the Architect, and he reserves the right to make any reasonable changes in the locations indicated without additional cost.

1.9 SHOP DRAWINGS

A. After the Contract is awarded, but prior to proceeding with the Work, the Contractor shall obtain, check, certify, and submit complete Shop Drawings from Manufacturers, Suppliers, Vendors, etc., for all materials and equipment specified herein. Submit Shop Drawings in sufficient time so as not to impede the progress of work. At least two weeks will be required for the processing of Shop Drawings in the Engineer's office, exclusive of transmittal time. This time shall be considered by the Contractor when scheduling submittal data.

B. The Engineer's review of Shop Drawings shall not relieve the Contractor of the responsibility for dimensions, errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the Engineer's noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the submittal data review.

C. The submittal format shall follow the Specifications format with a submittal required for each section of this Division. Each major category of equipment shall be submitted under a separate cover letter. Provide TABLE OF CONTENTS.

D. Minimum size of submittal data shall be 8-1/2" x 11".

E. No allowances will be made for submittals which are not made in a timely fashion or which are turned down because they are not equal. Should delivery problems arise due to the above, affecting the completion time of the project, the Contractor will furnish and install acceptable alternates until the proper materials arrive and then replace the alternate materials with the approved materials, all at no cost to the Owner. If the Contractor is not able to furnish an acceptable alternate until the proper materials arrive, he will assume all costs for furnishing and installing all
alternates as directed by the Architect and/or will pay a suitable penalty for the inconvenience experienced by the Owner. This penalty will be set by the Architect based on the particular circumstances.

1.10 SUBSTITUTIONS

A. The listing of product manufacturers, catalog numbers, etc., on the drawings or specifications is intended to establish a standard of quality only, and is not intended to preclude open, competitive bidding. The Contractor may at his option submit substitute materials or methods which he feels are equal or superior to those specified. If the Contractor does submit alternate materials or methods, it shall be understood that the Contractor:

1. Has personally investigated the proposed substitute product and determined that it has all the same accessories and is equal or superior in all respects to the item specified.

2. Will provide the same guarantee for the substitution that he would for that specified.

3. Has coordinated the installation of the equipment which he proposes to substitute with all other trades especially in regard to electrical requirements and to operating weights trades and includes the costs for any changes required for the work to be complete in all respects. The Contractor will prepare shop drawings where required by the Architect or where dimensions vary.

4. Waives any and all claims for additional costs related to the substitution.

1.11 RECORD DRAWINGS

A. The Contractor shall keep a set of Drawings of the job, noting daily all changes made in the Drawings in connection with the final installation including exact dimensioned locations of all new and uncovered existing active and inactive utilities outside the building and shall turn over a clean, neatly marked set of sepias reproducible Drawings showing "as-buit" work to the A/E for delivery to the Owner. All underground utilities and services and systems shall be accurately located by the Contractor and dimensioned on the "as-buit" Drawings.

1.12 OPERATING AND MAINTENANCE MANUAL

A. Prepare and submit to the Architect for delivery to the Owner an indexed manual with complete technical data for every piece of equipment and material installed under this contract.
1. Complete submittals as approved by Architect.

2. Manufacturer's installation instruction brochures.

3. Manufacturer's local representative and/or Distributor's name, address and phone number.

4. Manufacturer's operating and maintenance brochures.

5. Replacement part number listings and/or descriptions.


7. Valve tag list.

B. This manual shall include all of the listed data bound into one document. The document shall be identified as "Operating and Maintenance Manual" with the names and location of the Building, the Owner, the Architect, the Engineers, the General Contractor, and the Sub-Contractors installing equipment represented in the document.

C. Contents of the Manual shall be grouped in sections according to the various sections of the specifications and shall be listed in a Table of Contents.

PART 2 PRODUCTS

2.1 STANDARDS FOR MATERIALS

A. All materials, in general, shall conform to the requirements of all agencies of publications hereinbefore specified under the paragraph QUALITY ASSURANCE and shall be listed, inspected, and approved by the Underwriters Laboratories and shall bear the U.L. label where labeling service is available. The label or listing of the Underwriters Laboratories, Inc. will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor may submit a statement from a nationally recognized testing agency indicating that the items have been tested in accordance with required procedures, and that the materials and equipment comply with all contract requirements.

2.2 STANDARD PRODUCTS

A. Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.
2.3 MANUFACTURERS INSTRUCTIONS

A. The responsibility for the furnishing of the proper equipment and/or material and the responsibility for seeing that it is installed as intended by the manufacturer, rests entirely upon the Contractor. If needed for proper installation, operation, or startup, the Contractor shall request advice and supervisory assistance from the representative of the specific manufacturer. The manufacturers' published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment, unless otherwise indicated. The Contractor shall promptly notify the Architect in writing of any conflict between the requirements of the contract documents and the manufacturers' directions and shall obtain the Architect's instructions before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturers' directions or such instructions from the Architect, he shall bear all costs arising in connection with the deficiencies.

2.4 RUST PREVENTION

A. All metallic materials shall be protected against corrosion. Exposed metallic parts of outdoor apparatus made of ferrous metals but not of corrosion-resistant steel, shall be zinc-coated in accordance with ASTM A123 or A153, except where other equivalent protective treatment is specifically approved in writing.

2.5 STORAGE ON SITE

A. The Contractor shall not receive material or equipment at the job site until ready for installation or until there is a suitable space provided to properly protect equipment from rust, weather, humidity, dust, or physical damage.

2.6 CAPACITIES

A. Capacities shall be not less than those indicated and shall be such that no component or system becomes inoperative or is damaged because of startup or other overload conditions.

2.7 NAMEPLATES

A. Each major component of equipment shall have the manufacturer's name, address, and catalog number on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of final inspection.

2.8 CONDITION OF MATERIAL AND APPURTENANCES

A. All pipe, fittings, appurtenances, and other material required for complete installation of these systems shall be new to conform to manufacturer's
recommendations, unless otherwise specified. All equipment injured or damaged in transit from factory, during delivery to premises, while in storage on premises, while being erected and installed, and while being tested, until time of substantial completion, shall be replaced by the Contractor without extra cost to Owner.

PART 3  EXECUTION

3.1  INSTALLATION OF SYSTEMS

A. Provide and install unions at proper points to permit removal of pipe and various equipment and machinery items without injury to other parts of system. No union will be required in welded lines or lines assembled with solder joint fittings, except at equipment items, machinery items, and other special pieces or apparatus. Companion flanges on lines at various items of equipment, machines and pieces of apparatus, shall serve as unions to permit removal of the particular items. Unions connecting ferrous pipe to copper or brass pipe shall be dielectric type.

3.2  SPACE AND EQUIPMENT ARRANGEMENT

A. All equipment shall be installed in a manner to permit access to parts requiring service without disassembly of other equipment.

B. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly protected against damage.

3.3  PRECEDENCE OF WORK

A. This contract includes many different systems furnished and installed by different trades. Each trade shall coordinate their work with that of all other trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping any other trades.

3.4  EXCAVATION AND BACKFILL

A. The Contractor shall perform all excavation of every description required in the execution of his work. Excavation shall be through whatever substance encountered, to the depths indicated on the drawings, or as required. Excavated material suitable for backfill shall be piled in an orderly manner a sufficient distance from the trench to prevent overloading sides and causing cave-ins. Excavated materials not suitable for backfill shall be removed or stored as directed. Such grading shall be done as is necessary to protect the excavation from surface water. Trenches shall be maintained in a dry condition by bailing, pumping, or other
approved methods. Pipe shall not be laid in wet trenches. Sheetling and shoring shall be provided as required for the protection of the work and the safety of personnel.

B. Trenches shall be of the necessary width and depth to provide for proper laying of pipe and appurtenances, with banks as nearly vertical as possible. Bottoms of trenches shall be excavated to the grade and depth indicated or required, and barrel of pipe shall be laid on firm and undisturbed soil. Bell holes, of a size to permit proper grading, shall be provided as required. Over-depth excavations shall be backfilled to proper level with sand. When rock or other soil not suitable for bedding the pipe is encountered, it shall be removed to a depth of not less than 1' below grade, and backfilled with sand to grade, to provide a suitable bed for pipe. Existing underground piping shall be protected from damage during excavation and backfilling, and if damaged, shall be repaired to the Architect's satisfaction, at the Contractor's expense.

C. Trenches shall not be backfilled until all required tests have been performed. This requirement does not preclude sectional testing and backfilling of the various systems. Trenches shall be carefully backfilled with a minimum 6" sand cover over piping then backfilled with material (free from large earth clods, rocks, and/or foreign materials), laid in 6" layers, compacted to 90 percent of maximum dry density as determined by ASTM D698 (compaction shall be to 95 percent below structures, including sidewalks and roadways).

D. Open trenches abutting foundation or basement excavations, building walls, and grade beams, will not be permitted, but shall be backfilled and completed, for a distance of not less than 10' from the above features, as soon as possible. All damage resulting from flooding due to open trenches shall be paid for by the Contractor.

E. Where excavation requires, existing walks, street, drives, or other existing pavement shall be cut to install new lines and to make new connections to existing lines. The size of the cut shall be held to a minimum, consistent with the work to be accomplished. After the installation of the new materials is completed and the excavation has been backfilled, the paving shall be patched, using materials to match those cut out. The patches shall be thoroughly bound with the original surfaces, and shall be level with them.

3.5 CUTTING AND PATCHING

A. Where it becomes necessary to cut through any wall, floor, or ceiling to permit installation of any work under this section of the specifications or to repair any defects that may appear, up to the expiration of the guarantee period, such cutting shall be done under the observation of the Architect by the Contractor. The Contractor shall not be permitted to cut or modify any structural members without the written direction of the Architect.
B. Patching of all openings cut by the Contractor, or repairing of any damage to the work of other trades occasioned by the cutting operations, or occasioned by the failure of any part of work installed under this contract, shall be performed by the trade whose work is involved, but shall be paid for by the Contractor.

C. Any openings cut through exterior walls or roofs shall be provided with suitable covers, while they are left open, to protect the property or materials involved. Any openings cut through walls below grade shall be properly protected to prevent entrance of water or other damaging elements.

3.6 HOISTING, SCAFFOLDING, AND TRANSPORTATION

A. The Contractor shall provide his own hoisting facilities to set his materials and equipment in place in the building, as indicated on drawings and for subsequent cleaning, testing, and adjusting.

B. The Contractor shall provide necessary transportation to facilitate the delivery of all materials, equipment, tools, and labor to the job, in accordance with intent of these documents.

3.7 CLEANING

A. The Contractor shall, at all times, keep the premises free from accumulations of waste material or rubbish caused by him, his employees, or his work. This debris shall be removed, not only from the building, but also from the project site.

B. At completion of the job, the Contractor shall remove all of his tools, scaffolding, and surplus materials. He shall leave the area "broom clean."

3.8 ELECTRICAL WIRING OF MOTORS AND EQUIPMENT

A. Unless specifically shown, indicated, or specified to the contrary, each item shown or required by the Drawings or specified in the Specifications shall be accompanied by all motors and starting and controlling equipment necessary for the items’ proper operations. These motors shall be integrally attached to and/or installed with their associated equipment item and electrically connected as specified in the Electrical Specifications. Equipment controlled from motor control centers shall be supplied with motors only. Motor control centers are specified in the Electrical Specifications and shown on the Electrical Drawings.

END OF SECTION
220523 VALVES FOR PLUMBING

PART 1   GENERAL

1.1 WORK INCLUDED

A. Gate Valves
B. Ball Valves
C. Check Valves
D. Balancing Valves

1.2 RELATED WORK

A. Section 220500 – Common Work Results for Plumbing
B. Section 221100 - Plumbing Piping

1.3 SHOP DRAWINGS

A. Submit product data in accordance with Section 15010.

PART 2   PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Valves as manufactured by KITZ, Nibco, Crane, Apollo, Watts or approved equal are acceptable provided they meet or exceed these specifications.
B. Provide valve types of same manufacturer throughout where possible.
C. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.
D. Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube and equipment connections. Where more than one type is indicated, selection is installer's option. Valves shall be of same make for all these services.

2.2 VALVE CONNECTIONS
A. Provide valves suitable for connection to adjoining piping as specified for pipe joints. Use pipe size valves unless otherwise indicated.

B. Provide threaded valves for pipe sizes 2 inches and smaller.

C. Provide flanged valves for pipe sizes 2 1/2 inches and larger.

D. Solder or screw to solder adaptors for copper tubing.

2.3 GATE VALVES

A. Select valves, equipped with packing suitable for intended service. (Under no circumstances is asbestos acceptable) Select valves designed so back seating protects packing and stem threads from media when valve is fully opened, and equipped with gland follower. Guides for disc on rising stem valves must be machined for accurate fit.

B. Comply with the following standards:

Bronze Valves: MSS SP - 80

C. Domestic Water and Natural Gas Service

1. Threaded ends 2” and smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge: Kitz #44, Nibco T-111, Crane 428 or equal. (Non-rising gate valves may be used where headroom prevents full extension of rising stems: Kitz #40, Nibco T-113, Crane 438 or equal)

2. Solder ends 2” and smaller: Class 125, bronze body, screwed bonnet, rising stem, solid wedge: Kitz #44, Nibco S-111, Crane 428 or equal. (Non-rising stem gate valves may be used where headroom prevents full extension of rising stems: Kitz #41, Nibco S-113, Crane 438 or equal)

3. Flanged ends 2” and larger: Class 125 iron body, bronze mounted, bolted bonnet, rising stem, OS&Y, solid wedge: Kitz #72, Nibco F617-0, Crane 465-1/2 or equal.

2.4 BALL VALVES

A. Select with full port opening, blow out proof stem, hard chrome plated forged brass vented ball, adjustable packaging nut, rated not less than 600# W.O.G., 150 W.S.P.

B. Comply with the following standards:

Ball Valves: MSS SP - 110
C. Domestic Water Service

1. Threaded ends 3\" and smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated full port forged brass ball, true adjustable packing nut, blow-out proof stem: Kitz #68, Nibco T-585-70, Apollo 77-100 Series, Watts 6080 or equal.

2. Solder ends 3\" and smaller: 600# W.O.G., 150 W.S.P., bronze two piece body, hard chrome plated full port forged brass ball, true adjustable packing nut, blow-out proof stem: Kitz #69, Nibco S-585-70, Apollo 77-200 Series, Watts B-6081 or equal.

D. Natural Gas Service

1. Threaded ends 2\" and smaller: 175# W.O.G., bronze two piece body, hard chrome plated full port forged brass ball, true adjustable packing nut, blow-out proof stem, U.L. listed for natural gas service: Kitz #60, Nibco GB, Watts GBV or equal.

2.5 SWING CHECK VALVES

A. Comply with the following standards for design, workmanship, material and testing:

   Bronze Valves: MSS SP - 80

B. Construct valves of pressure casting free of any impregnating materials

C. Domestic Water Service

1. Threaded ends 2\" and smaller: Class 125, bronze body, screwed cap, "Y" pattern swing, bronze disc: Kitz #22, Nibco T-413B, Crane 37 or equal.

2. Soldered ends 2\" and smaller: Class 125, bronze body, screwed cap, "Y" pattern swing, bronze disc: Kitz #23, Nibco T-413B, Crane 1342 or equal.

3. Flanged ends 2-1/2\" and larger: Class 125, iron body, bronze mounted, horizontal swing, cast-iron disc: Kitz #78, Nibco F918-B, Crane 373 or equal.

2.6 BALANCING VALVES

A. Manual Balance Valve: Furnish and install as shown on plans, a calibrated (bronze/cast iron with bronze disc) balance valve equipped with readout valves to facilitate the connecting of a differential pressure meter. Each readout valve shall be fitted with an integral check valve designed to minimize system fluid loss during the monitoring process. The balancing valve shall have an indexing pointer and
calibrated nameplate to indicate the degree of closure of the precision machined orifice. Each balancing valve is to be constructed with internal O-ring seals to prevent leakage around the rotating element. The balancing valves shall be supplied with performed polyurethane insulation, suitable for use on heating and cooling system.

2.7 VALVE FEATURES

A. Provide valves with features indicated and where not otherwise indicated, provide proper valve features as outlined in this specification. Comply with ANSI B31.1.


C. Threaded valve ends comply with ANSI B2.1.

D. Solder Joint valve ends complying with ANSI B16.18.

E. Fabricate pressure-containing components of valves, including stems and seats from brass or bronze materials; of standard alloy recognized in valve manufacturing that resist de-zincification.

2.8 VALVE OPERATORS

A. Provide suitable handwheels for all valves.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted.

B. Install ball valves on all water piping 3” and smaller for shut-off and isolating service, to isolate equipment, part of systems, or vertical risers.

C. Provide shut-off valves and check valves on discharge of pumps.

D. Install check valves in horizontal position with pin horizontally perpendicular to center line of pipe. Install for proper direction of flow. Installations on any vertical piping must be up flow only.

E. Valves used for natural gas shall be listed for such use.

F. All valves shall be located so that the bonnets can be removed.
G. Where valves are installed concealed in pipe chases provide access doors with concealed hinge and key operated locks. Door shall be large enough to service valves and shall be installed flush with finished walls.

H. Provide brass tag for each valve labeling the fluid in the pipe, the area served, and the normal operating position.

END OF SECTION
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220529 SUPPORTS, ANCHORS AND SLEEVES FOR PLUMBING

PART 1 GENERAL

1.1 WORK INCLUDED
   A. Pipe Hangers and Supports

1.2 RELATED WORK
   A. Section 220500 – Common Work Results For Plumbing
   B. Section 221100 - Plumbing Piping

1.3 SUBMITTALS
   A. Submit shop drawings in accordance with Section 220500 Common Work Results For Plumbing.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
   A. Products shall be as manufactured by Grinnell, MIFAB, Elcen, Fee and Mason, Unistrut or approved equal.

2.2 INSERTS
   A. Malleable iron case of galvanized steel sheet and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms.
   B. Size inserts to suit threaded hanger rods.

2.3 PIPE HANGERS AND SUPPORTS
   A. Hangers: Pipe sizes 1/2 inch to 1-1/2 inch: adjustable wrought steel ring.
   B. Hangers: Pipe sizes 2 inches to 4 inches: adjustable wrought steel clevis.
   C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   D. Vertical Support: Steel riser clamp.
E. Steel Beam Clamps: Elcen Figure 33, Type 3 or approved equal.

F. Design hangers to impede disengagement by movement of supported pipe.

G. Provide copper plated hangers and supports for copper piping or two layers Scotch 33 PVC tape or equal.

2.4 HANGER RODS

A. Provide cadmium plated steel hanger rods, threaded both ends, threaded one end, or continuous threaded.

2.5 SLEEVES

A. Pipes through Walls, Fire Proofing, Footings, Potentially Wet Floor: Form with galvanized steel pipe.

B. Size large enough to allow for movement due to expansion and to provide for continuous installation.

PART 3 EXECUTION

3.1 PIPE HANGERS AND SUPPORTS

A. All structures and appurtenances employed for the purpose of supporting the pipe and guiding it properly shall be carefully fabricated in such a manner as to preserve the true grade of the pipe without subjecting either the pipe or the supporting and guidance members to any undue strain.

B. Support horizontal piping as follows:

C. Space hangers and furnish rods as follows:

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<tr>
<th>Nominal Pipe Size (in.)</th>
<th>Span (ft.)</th>
<th>Hanger Rod Diameter (in.)</th>
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<tr>
<td></td>
<td>Steel</td>
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D. Install hangers to provide minimum 1/2 inch clear space between finished covering and adjacent work.

E. Place a hanger within one foot of each horizontal elbow.

F. Use hangers which are vertically adjustable 1-1/2 inch maximum after piping is erected.

G. Support piping at each change or direction, at ends of branches, at base and top of riser pipes and drops, and wherever necessary to prevent sag, bending or vibration, in addition to above-listed hanger spacing.

H. Pipe hangers on insulated lines shall be sized to fit the outside of the insulation.

I. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers, designed to support loads per ANSI B31.1.

J. Where practical, support riser piping independently of connected horizontal piping.

3.2 PRIMING

A. Prime coat non-galvanized steel hangers and supports.

3.3 SLEEVES

A. Set sleeves in position in advance of concrete work. Provide suitable reinforcing around sleeves.

B. Where piping passes through floor, ceiling or wall close off space between pipe or duct and construction with non-combustible insulation. Provide tight fitting metal caps on both sides and caulk.

C. Install chrome plated escutcheons where piping passes through finished surfaces.

D. Size pipe sleeves to permit placing pipe and specified insulation material for pipes passing through concrete or masonry walls or concrete slabs.

E. Insulated pipe shall be insulated in sleeves, caulked and pointed as above.

F. Pipe sleeves, pitch pockets, and flashings compatible with the roofing installation shall be provided for roof penetrations.

G. All piping shall be installed with due regard to expansion and contraction. Type of hanger, methods of support, location of supports, etc., shall be governed in part by this consideration.
END OF SECTION
220640 PLUMBING FIXTURES

PART 1 GENERAL

1.1 WORK INCLUDED
   A. Water Closets
   B. Urinals
   C. Lavatories
   D. Sinks

1.2 RELATED WORK
   A. Section 220500 – Common Work Results For Plumbing
   B. Section 220529 - Supports, Anchors and Sleeves For Plumbing
   C. Section 221100 - Plumbing Piping

1.3 REFERENCES
   A. ANSI A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.
   B. ANSI A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.
   C. ANSI A112.19.2 - Vitreous China Plumbing Fixtures.
   D. ANSI A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

1.4 QUALITY ASSURANCE
   A. Fixtures: By same manufacturer for each type of product specified throughout.
   B. Trim: By same manufacturer for each type of product specified throughout.

1.5 SUBMITTALS
   A. Submit product data in accordance with Section 220500.
   B. Include fixtures, sizes, [rough-in dimensions], utility sizes, trim, and finishes.

1.6 OPERATION AND MAINTENANCE DATA
A. Submit operation and maintenance data in accordance with Section 220500.

B. Include fixture trim exploded view and replacement parts lists.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - FIXTURES

A. Products manufactured by American Standard, Crane, Elkay, Just, Kohler, or approved equal meeting these specifications are acceptable.

2.2 ACCEPTABLE MANUFACTURERS - FIXTURE TRIM

A. Products manufactured by American Standard, Delta Faucet, Chicago Faucets, Kohler, Sloan or approved equal meeting these specifications are acceptable.

2.3 ACCEPTABLE MANUFACTURERS - P-TRAP, STOP & SUPPLIES INSULATION

A. Products manufactured by McGuire, Truebro or approved equal meeting these specifications are acceptable.

2.4 ACCEPTABLE MANUFACTURERS - WATER CLOSET SEATS

A. Products manufactured by Beneke, Church, Olsonite, or approved equal meeting these specifications are acceptable.

2.5 ACCEPTABLE MANUFACTURERS - FIXTURE CARRIERS

A. Products manufactured by Josam, J. R. Smith, Zurn, Wade, Watts or approved equal meeting these specifications are acceptable.

PART 3 EXECUTION

3.1 INSPECTION

A. Review architectural drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.2 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.
B. Provide chrome plated rigid or flexible supplies to fixtures with loose key and/or screwdriver stops reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and/or wall carriers and bolts.

E. Mount fixtures at heights per code.

3.3 ADJUSTING AND CLEANING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

B. At completion clean plumbing fixtures and equipment.

END OF SECTION
220719 PLUMBING PIPING INSULATION

PART 1   GENERAL

1.1  WORK INCLUDED

A. Insulation of Domestic Hot Water Piping

1.2  RELATED WORK

A. Section 220500 – Common Work Results For Plumbing

B. Section 221100 - Plumbing Piping

1.3  QUALITY ASSURANCE

A. All insulation materials required for piping, and mechanical equipment, etc. shall be furnished and installed under this contract. The execution of the work shall be by approved insulation contractor in strict accordance with the best practice of the trade and the intent of this Specification.

B. It is mandatory that all insulation be applied in a neat and workmanlike manner. Contractor shall be required to remove and replace all insulation not applied in strict accordance with manufacturer's specifications or not presenting a neat finished appearance.

C. All insulation on indoor work shall have composite (insulation, jacket or facing, and adhesive used to adhere jacket or facing to the insulation) fire and smoke hazard Ratings, as tested by procedure ASTM E-84, NFPA 255 and UL 73 not exceeding Flame Spread of 25, Fuel Contributed of 50 and Smoke Developed of 50. Accessories, such as adhesives, mastics, cements, tapes and cloths for fittings shall have component ratings as listed above.

D. Insulation shall be continuous through wall, floor and ceiling openings and sleeves.

E. Specified mastics, adhesives and coatings shall be applied in strict accordance with manufacturer's instructions, including recommended coverages.

1.4  SUBMITTALS

A. Submit materials and installation instructions in accordance with Section 220000 Plumbing.
PART 2  PRODUCTS

2.1  ACCEPTABLE MANUFACTURERS

A. Products manufactured by Owens-Corning, Knauf, Johns Manville, Certain-Teed, Govain, Benjamin Foster are acceptable provided they meet or exceed these specifications.

2.2  PIPING

A. Piping:

1. Insulation thickness - Fiberglass pipe covering.

<table>
<thead>
<tr>
<th>PIPING TYPE</th>
<th>PIPE SIZE</th>
<th>INSULATION SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Hot Water Supply &amp; Return</td>
<td>2&quot; &amp; under</td>
<td>1&quot;</td>
</tr>
</tbody>
</table>

2. All fiberglass pipe insulation shall be nominal 5 pcf density.

3. Insulation jacket shall be factory applied white All Service Jacket (ASJ), with factory supplied self-sealing laps.

4. Fittings, Valves and Flanges:

   a. Where manufactured, factory premolded fittings (of the same material and thickness as the pipe insulation) shall be used for all fittings, flanges and valves.

   b. Where premolded insulation fittings are not manufactured, all fittings, flanges and valves shall be insulated with mitered segments of nominal 5 lb. density fiberglass pipe covering. Hot Service Finish: embed a 20 x 20 weave white glass reinforcing cloth between two 1/16 inch coats of Benjamin Foster 30-36. The glass cloth and second coat shall overlap adjacent covering by at least two inches. Cold Service Finish: same as above except use Benjamin Foster 30-35.

5. Insulation on pipes shall be protected by saddles from hangers, guides, and rollers.

6. Any piping subject to freezing shall be covered with minimum layer of 2 inch fiberglass. Install heating cable when specified between pipe and insulation.

PART 3  EXECUTION
3.1 PREPARATION

A. Do not install covering before piping and equipment has been tested and approved.

B. Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application.

3.2 INSTALLATION

A. Provide a minimum 12” long, high density insulation insert such as calcium silicate or its equivalent at each support. Insert shall be the same thickness as adjacent piping.

B. Ensure insulation is continuous through inside walls. Pack around pipes with fire proof self-supporting insulation material, fully sealed.

C. Insulate fittings and valves.

D. Finish insulation neatly at hangers, supports and other protrusions.

E. Locate insulation cover seams in least visible locations.

F. Cold Piping: Cover fittings and valves with equivalent thickness of insulation material. Cover with open mesh glass cloth sealed with vapor barrier sealant. Seal lap joints with 100% coverage of vapor barrier sealant and adhesive. Seal butt joints with 4 inches wide strips of vapor barrier sealed with vapor barrier adhesive. For exposed fittings and valves, apply hydraulic setting cement paste over insulation material before applying canvas jacket.

G. Hot Piping: Cover fittings and valves with equivalent thickness of insulation material. For exposed fittings and valves apply hydraulic setting cement paste over insulating material before applying canvas jacket.

H. Cover exposed insulation with 8 oz. canvas jacket.

I. Repair separation of joints or cracking of insulation due to thermal movement or poor workmanship.

END OF SECTION
PART 1   GENERAL

1.1 WORK INCLUDED
A. Sanitary Sewer Piping System
B. Domestic Water Piping System
C. Condensate Piping System
D. Natural Gas Piping System

1.2 RELATED WORK
A. Section 220000 – Common Work Results For Plumbing
B. Section 220523 – Valves For Plumbing
C. Section 220529 – Supports, Anchors and Sleeves For Plumbing
D. Section 220640 – Plumbing Fixtures
E. Section 220719 – Plumbing Piping Insulation
F. Section 221119 – Plumbing Specialties

1.3 REFERENCES
A. ANSI/ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
B. ANSI/ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder. Joint Drainage Fittings - DWV.
C. ANSI/ASME Sec. 9 - Welding and Brazing Qualifications.
D. ANSI/ASTM B32 - Solder Metal.
E. ASTM B88 - Seamless Copper Water Tube.
F. ASTM B306 - Copper Drainage Tube (DWV).
G. AWS 5.8 - Brazing Filler Metal.

1.4 QUALITY ASSURANCE
A. Valves: Manufacturer's name and pressure rating marked on valve body.

1.5 SUBMITTALS

A. Submit product data in accordance with Section 220500.

B. Include data on pipe materials, pipe fittings, and accessories.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Pipe: PVC Schedule 40 DWV Pipe; ASTM D 2665. Fittings: PVC Joints; ASTM D 2665, solvent weld

2.2 SANITARY SEWER PIPING, ABOVE GRADE


2.3 WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Tubing: ASTM B88, Type K, annealed. Fittings: NONE. Joints: NONE.


2.4 WATER PIPING, ABOVE GRADE


2.5 CONDENSATE PIPING, ABOVE GRADE


2.6 NATURAL GAS PIPING, ABOVE GRADE

2.7 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; neoprene gaskets for gas service; 1/16 inch thick preformed neoprene bonded to asbestos.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

PART 3 EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Provide access doors to match wall or ceiling construction where valves and fittings are not exposed.

H. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting where exposed.

I. Establish invert elevations, slopes for drainage to 1/4 inch per foot (2 percent) minimum for sewer piping.
J. Natural gas piping exposed to weather shall be cleaned, primed, and provided with two coats of yellow oil based paint.

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

3.4 TESTING

A. Test soil and vent systems by plugging lines and filling systems with water to a static head of ten (10) feet of water. Observe water level for two (2) hours. If level is lowered, indicating leakage, repair leaks and test again until no further leakage is detected.

B. Test water piping at 100 psig for a continuous period of four (4) hours. During this time, carefully inspect the system for leaks. If necessary, repair leaks and test again until no further leakage is detected.

C. Test gas piping at 50 psig for a continuous period of four (4) hours. During this time, carefully inspect the system for leaks. If necessary, repair leaks and test again until no further leakage is detected.

END OF SECTION
PART 1   GENERAL

1.1 WORK INCLUDED
   A. Floor Drains
   B. Cleanouts

1.2 RELATED WORK
   A. Section 220500 – Common Work Results For Plumbing
   B. Section 220640 - Plumbing Fixtures
   C. Section 221100 - Plumbing Piping

1.3 REFERENCES
   A. ANSI A112.21.1 - Floor Drains.

1.4 QUALITY ASSURANCE
   A. Manufacturer: For each type of product specified, provide components by same manufacturer throughout.

1.5 SUBMITTALS
   A. Submit shop drawings and product data in accordance with Section 220500.

PART 2   PRODUCTS

2.1 FLOOR DRAINS
   A. Manufacturers: Josam, MIFAB, J.R. Smith, Watts, Zurn or approved equal meeting these specifications are acceptable.

2.2 CLEANOUTS
   A. Manufacturers: Josam, MIFAB, J.R. Smith, Wade, Watts, Zurn or approved equal meeting these specifications are acceptable.
   B. Exterior Surfaced Areas: Round coated cast iron body with cast iron non-skid cover and plug; Model 4225 manufactured by J.R. Smith.
C. Exterior Unsurfaced Areas: Line type with coated cast iron body and round gasketed cover; Model 4255 manufactured by J.R. Smith.

D. Interior Finished Floor Areas: Coated cast iron body with round nickel bronze scoriated cover; Model 4020 manufactured by J.R. Smith.

E. Interior Finished Wall Areas: Line type with coated cast iron body and cast iron lead seal plug, and round stainless steel access cover secured with machine screw; Model 4402 manufactured by J.R. Smith.

PART 3 EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer’s instructions to permit intended performance.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

END OF SECTION

END OF DIVISION
DIVISION 23 - MECHANICAL

230500 COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 RELATED WORK

A. General Conditions

B. Special Conditions

C. Supplementary General Conditions

D. Architectural, Structural, Civil, Electrical and Mechanical Drawings & Specifications

1.2 SCOPE OF WORK

A. The work covered by the Mechanical Sections of the Specifications shall include the furnishing of all materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of all mechanical and plumbing work required in the Contract Drawings.

B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified in this Section or work specified in other sections, it shall be the responsibility of the Contractor to provide all material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned or not.

C. The Contractor shall visit the premises and thoroughly familiarize himself with all the details of the work and working conditions and to verify all dimensions in the field. The Contractor shall advise the Architect of any discrepancy prior to bidding. The submission of bids shall be deemed evidence of the Contractor's site visit, the coordination of all existing conditions, and the inclusion of all considerations for existing conditions.

1.3 PLANS AND SPECIFICATIONS

A. These Specifications are accompanied by drawings of the building and details of the installations indicating the locations of equipment, piping, ductwork, outlets, etc. The drawings and these specifications are complementary to each other, and what is required by one shall be as binding as if required by both.

B. If departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Architect for
review. No departures shall be made without prior written acceptance of the
Architect.

C. The interrelation of the specifications, the drawings, and the schedules is generally
as follows: The specifications determine the nature and setting of the materials, the
drawings establish the quantities, dimensions, and details, and the schedules give
the performance characteristics.

D. Should the drawings disagree in themselves or with the specifications, the
contractor shall immediately notify the architect and shall perform and/or furnish the
better quality or greater quantity of work or materials unless otherwise directed by
the architect in writing. In case the specifications should not fully agree with the
schedules, the latter shall govern. Figures indicated on drawings govern scale
measurements and large scale details govern small scale drawings. In case of
disagreement between specifications and drawings, see Division I of these
specifications for clarifications.

E. Items specifically mentioned in the specifications but not shown on the drawings
and/or items shown on the drawings but not specifically mentioned in the
specifications shall be installed by the Contractor under the appropriate section of
work as if they were both specified and shown.

1.4 QUALITY ASSURANCE

A. All work shall comply with the applicable rules of the following:

1. 2018 International Building Code
2. 2018 International Mechanical Code
3. 2018 International Plumbing Code
4. 2018 International Fire Code
5. 2018 International Energy Conservation Code
6. National Fire Protection Association Codes
7. State Fire Marshall
8. Latest edition of Sheet Metal and Air Conditioning Contractors’ National
   Association, Inc. (SMACNA) Standards.
9. All applicable city, county, state, and federal rules, codes, and ordinances.
B. In any instance where these specifications call for materials for construction of a better quality or larger size than required by the codes, the provisions of these specifications shall take precedence. None of the terms or provisions of this specification shall be construed as waiving any rules, regulations, or requirements of these authorities. The codes shall govern in case of direct conflict between the codes and the Drawings.

1.5 SUPERVISION

A. A competent foreman or superintendent, initially approved by the Architect, shall be assigned to the project to receive instructions and to act for the Contractor. Once this superintendent has been approved, no change shall be made without approval of the Architect. Architect's authorized representative and/or owner's observer shall have the right to observe the work at any time. The Contractor shall have a representative present when his work is being observed, and he shall give assistance, as may be required, to the Architect's representative. Recommendations made by the observer shall be promptly carried out, and all unsatisfactory material and/or workmanship shall be replaced at once, to the satisfaction of the Architect.

1.6 GUARANTEE

A. The Contractor shall guarantee all materials and workmanship for a period of two (2) years after the final acceptance of work.

1.7 BUILDING CONSTRUCTION AND LAYOUT OF WORK

A. It shall be the responsibility of the Contractor to consult the architectural and engineering drawings and details so as to thoroughly familiarize himself with the type and quality of construction to be provided on this project.

B. The Drawings are diagrammatic in character and cannot show every connection in detail or every pipe and duct in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The 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 or above suspended ceilings, etc., in finished portions of the building, unless specifically noted or indicated to be exposed. Work shall be installed to avoid crippling of structural members; therefore, inserts to accommodate hangers shall be set before concrete is poured, and proper openings through floor, walls, beams, etc., shall be provided as hereinafter specified or as otherwise indicated or required before concrete is poured. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted.
C. The approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details in regard to location. Exact locations are to be determined by actual measurements at the building and will in all cases be subject to the approval of the Architect, and he reserves the right to make any reasonable changes in the locations indicated without additional cost.

1.8 SHOP DRAWINGS

A. After the Contract is awarded, but prior to proceeding with the Work, the Contractor shall obtain, check, certify, and submit complete Shop Drawings from Manufacturers, Suppliers, Vendors, etc., for all materials and equipment specified herein. Submit Shop Drawings in sufficient time so as not to impede the progress of work. At least two weeks will be required for the processing of Shop Drawings in the Engineer's office, exclusive of transmittal time. This time shall be considered by the Contractor when scheduling submittal data.

B. The Engineer's review of Shop Drawings shall not relieve the Contractor of the responsibility for dimensions, errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the Engineer's noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the submittal data review.

C. The submittal format shall follow the Specifications format with a submittal required for each section of this Division. Each major category of equipment shall be submitted under a separate cover letter. Provide TABLE OF CONTENTS.

D. Minimum size of submittal data shall be 8-1/2" x 11".

E. No allowances will be made for submittals which are not made in a timely fashion or which are turned down because they are not equal. Should delivery problems arise due to the above, affecting the completion time of the project, the Contractor will furnish and install acceptable alternates until the proper materials arrive and then replace the alternate materials with the approved materials, all at no cost to the Owner. If the Contractor is not able to furnish an acceptable alternate until the proper materials arrive, he will assume all costs for furnishing and installing all alternates as directed by the Architect and/or will pay a suitable penalty for the inconvenience experienced by the Owner. This penalty will be set by the Architect based on the particular circumstances.

1.9 SUBSTITUTIONS

A. The listing of product manufacturers, catalog numbers, etc., in the various sections of the specifications is intended to establish a standard of quality only, and is not intended to preclude open, competitive bidding. The Contractor may at his option...
submit substitute materials or methods which he feels are equal or superior to those specified. If the Contractor does submit alternate materials or methods, it shall be understood that the Contractor:

1. Has personally investigated the proposed substitute product and determined that it has all the same accessories and is equal or superior in all respects to the item specified.

2. Will provide the same guarantee for the substitution that he would for that specified.

3. Has coordinated the installation of the equipment which he proposes to substitute with all other trades especially in regard to electrical requirements and to operating weights trades and includes the costs for any changes required for the work to be complete in all respects. The Contractor will prepare shop drawings where required by the Architect or where dimensions vary.

4. Waives any and all claims for additional costs related to the substitution.

1.10 RECORD DRAWINGS

A. The Contractor shall keep a set of Drawings of the job, noting daily all changes made in the Drawings in connection with the final installation including exact dimensioned locations of all new and uncovered existing active and inactive utilities outside the building and shall turn over a clean, neatly marked set of sepias reproducible Drawings showing "as-built" work to the A/E for delivery to the Owner. All underground utilities and services and systems shall be accurately located by the Contractor and dimensioned on the "as-built" Drawings.

1.11 OPERATING AND MAINTENANCE MANUAL

A. Prepare and submit to the Architect for delivery to the Owner an indexed manual with complete technical data for every piece of equipment and material installed under this contract.

1. Complete mechanical submittals as approved by Architect.

2. Manufacturer's installation instruction brochures.

3. Manufacturer's local representative and/or Distributor's name, address and phone number.

4. Manufacturer's operating and maintenance brochures.

5. Manufacturer's internal wiring diagrams.
B. This manual shall include all of the listed data bound into one document. The document shall be identified as "Operating and Maintenance Manual" with the names and location of the Building, the Owner, the Architect, the Engineers, the General Contractor, and the Sub-Contractors installing the equipment represented in the document.

C. Contents of the Manual shall be grouped in sections according to the various sections of the specifications and shall be listed in a Table of Contents.

PART 2 PRODUCTS

2.1 STANDARDS FOR MATERIALS

A. All materials, in general, shall conform to the requirements of all agencies of publications hereinbefore specified under the paragraph QUALITY ASSURANCE and shall be listed, inspected, and approved by the Underwriters Laboratories and shall bear the U.L. label where labeling service is available. The label or listing of the Underwriters Laboratories, Inc. will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor may submit a statement from a nationally recognized testing agency indicating that the items have been tested in accordance with required procedures, and that the materials and equipment comply with all contract requirements.

2.2 STANDARD PRODUCTS

A. Materials and equipment to be provided shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two years.

2.3 MANUFACTURERS INSTRUCTIONS

A. The responsibility for the furnishing of the proper equipment and/or material and the responsibility for seeing that it is installed as intended by the manufacturer, rests entirely upon the Contractor. If needed for proper installation, operation, or startup, the Contractor shall request advice and supervisory assistance from the representative of the specific manufacturer. The manufacturers’ published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment, unless otherwise indicated. The Contractor shall promptly notify the Architect in writing of any conflict between the requirements of the contract documents and the manufacturers' directions and shall obtain the Architect's instructions before proceeding with the work. Should the Contractor perform any such work that does not comply with the manufacturers'
directions or such instructions from the Architect, he shall bear all costs arising in connection with the deficiencies.

2.4 RUST PREVENTION

A. All metallic materials shall be protected against corrosion. Exposed metallic parts of outdoor apparatus made of ferrous metals but not of corrosion-resistant steel, shall be zinc-coated in accordance with ASTM A123 or A153, except where other equivalent protective treatment is specifically approved in writing.

2.5 STORAGE ON SITE

A. The Contractor shall not receive material or equipment at the job site until ready for installation or until there is a suitable space provided to properly protect equipment from rust, weather, humidity, dust, or physical damage.

2.6 CAPACITIES

A. Capacities shall be not less than those indicated and shall be such that no component or system becomes inoperative or is damaged because of startup or other overload conditions.

2.7 NAMEPLATES

A. Each major component of equipment shall have the manufacturer's name, address, and catalog number on a plate securely attached to the item of equipment. All data on nameplates shall be legible at the time of final inspection.

2.8 CONDITION OF MATERIAL AND APPURTENANCES

A. All pipe, fittings, appurtenances, and other material required for complete installation of these systems shall be new to conform to manufacturer's recommendations, unless otherwise specified. All equipment injured or damaged in transit from factory, during delivery to premises, while in storage on premises, while being erected and installed, and while being tested, until time of substantial completion, shall be replaced by the Contractor without extra cost to Owner.

PART 3 EXECUTION

3.1 INSTALLATION OF SYSTEMS

A. Provide and install unions at proper points to permit removal of pipe and various equipment and machinery items without injury to other parts of system. No union will be required in welded lines or lines assembled with solder joint fittings, except at equipment items, machinery items, and other special pieces or apparatus.
Companion flanges on lines at various items of equipment, machines and pieces of apparatus, shall serve as unions to permit removal of the particular items. Unions connecting ferrous pipe to copper or brass pipe shall be dielectric type.

3.2 SPACE AND EQUIPMENT ARRANGEMENT

A. All equipment shall be installed in a manner to permit access to parts requiring service without disassembly of other equipment.

B. Any large piece of apparatus which is to be installed in any space in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly protected against damage.

3.3 PRECEDENCE OF WORK

A. This contract includes many different systems furnished and installed by different trades. Each trade shall coordinate their work with that of all other trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping any other trades.

3.4 CUTTING AND PATCHING

A. Where it becomes necessary to cut through any wall, floor, or ceiling to permit installation of any work under this section of the specifications or to repair any defects that may appear, up to the expiration of the guarantee period, such cutting shall be done under the observation of the Architect by the Contractor. The Contractor shall not be permitted to cut or modify any structural members without the written direction of the Architect.

B. Patching of all openings cut by the Contractor, or repairing of any damage to the work of other trades occasioned by the cutting operations, or occasioned by the failure of any part of work installed under this contract, shall be performed by the trade whose work is involved, but shall be paid for by the Contractor.

C. Any openings cut through exterior walls or roofs shall be provided with suitable covers, while they are left open, to protect the property or materials involved. Any openings cut through walls below grade shall be properly protected to prevent entrance of water or other damaging elements.

3.5 HOISTING, SCAFFOLDING, AND TRANSPORTATION
A. The Contractor shall provide his own hoisting facilities to set his materials and equipment in place in the building, as indicated on drawings and for subsequent cleaning, testing, and adjusting.

B. The Contractor shall provide necessary transportation to facilitate the delivery of all materials, equipment, tools, and labor to the job, in accordance with intent of these documents.

3.6 CLEANING

A. The Contractor shall, at all times, keep the premises free from accumulations of waste material or rubbish caused by him, his employees, or his work. This debris shall be removed, not only from the building, but also from the project site.

B. At completion of the job, the Contractor shall remove all of his tools, scaffolding, and surplus materials. He shall leave the area "broom clean."

3.7 ELECTRICAL WIRING OF MOTORS AND EQUIPMENT

A. Unless specifically shown, indicated, or specified to the contrary, each item shown or required by the Drawings or specified in the Specifications shall be accompanied by all motors and starting and controlling equipment necessary for the items’ proper operations. These motors shall be integrally attached to and/or installed with their associated equipment item and electrically connected as specified in the Electrical Specifications. Equipment controlled from motor control centers shall be supplied with motors only. Motor control centers are specified in the Electrical Specifications and shown on the Electrical Drawings.

END OF SECTION
230529 SUPPORTS, ANCHORS AND SLEEVES FOR HVAC

PART 1 GENERAL

1.1 WORK INCLUDED

A. Pipe Hangers and Supports
B. Duct Hangers and Supports
D. Sleeving for Mechanical Equipment

1.2 RELATED WORK

A. Section 230500 – Common Work Results For HVAC
B. Section 233100 - HVAC Ducts

1.3 SUBMITTALS

A. Submit shop drawings in accordance with Section 230500 – Common Work Results For HVAC.

1.4 REFERENCES

A. Duct Hangers: SMACNA Duct Manuals.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products shall be as manufactured by Grinnell, Elgen, Fee and Mason, Unistrut or approved equal.

2.2 HANGER RODS

A. Provide cadmium plated steel hanger rods, threaded both ends, threaded one end, or continuous threaded.

2.3 DUCT HANGERS AND SUPPORTS

A. Hangers: Galvanized steel band iron or rolled angle and 3/8 inch rods.
B. Wall Supports: Galvanized steel band iron or fabricated angle bracket.
2.4 SLEEVES

B. Round Ducts: Form with 18 gauge galvanized steel.

C. Rectangular Ducts: Form with 18 gauge galvanized steel.

D. Size large enough to allow for movement due to expansion and to provide for continuous installation.

PART 3 EXECUTION

3.1 LOW VELOCITY DUCT HANGERS AND SUPPORTS

A. Duct hangers and supports to be sized and spaced as per SMACNA requirements.

3.2 PRIMING

A. Prime coat non-galvanized steel hangers and supports.

3.3 FLASHING

A. Flash and counterflash where mechanical equipment passes through weather or water proofed walls, floor and roofs.

B. Provide curbs for mechanical roof installation 12 inch minimum high. Flash and counterflash with steel, soldered and waterproofed.

3.4 SLEEVES

A. Where ductwork passes through ceiling or wall close off space between duct and construction with non-combustible insulation. Provide tight fitting metal caps on both sides and caulk.

B. Pipe and duct sleeves, pitch pockets, and flashings compatible with the roofing installation shall be provided for roof penetrations.

END OF SECTION
230593 TESTING, ADJUSTING AND BALANCING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Testing, adjusting and balancing of the following systems:

1. Air Distribution Systems

1.2 RELATED WORK

A. Section 230500 – Common Work Results For HVAC

D. Section 233713 - Diffusers, Registers & Grilles

1.3 REFERENCED STANDARDS

A. Associated Air Balance Council, AABC National Standards.

B. Applicable SMACNA Standards.


1.4 QUALITY ASSURANCE

A. All work for the testing and balancing of the HVAC air distribution and hydronic systems shall be done by an independent Testing and Balancing firm that specializes in and whose business is limited to the testing and balancing of heating, ventilating and air conditioning systems.

B. If requested, the test shall be conducted in the presence of the Architect and/or the Owner.

C. The environmental systems including all equipment, apparatus and distribution systems shall be tested, adjusted and balanced in accordance with the latest edition of the AABC Procedural Standards for Testing, Adjusting and Balancing of Air Distribution and Hydronic Systems.
D. Instruments used in all HVAC systems and equipment tests shall be as recommended by the AABC, ASHRAE, or as approved by the Architect. Test instruments used shall be initially and periodically checked thereafter to verify their calibration accuracy.

E. All test equipment shall be furnished by the Contractor and shall remain in his property. Any adapters such as "Pete's Plugs", pitot tube traverse connections, etc. shall be left in place and marked for future use.

1.5 SUBMITTALS

A. Submit test reports in accordance with Section 230500.

B. Specific procedures used in all tests shall be included in the test report. Contractor shall identify all equipment by the identification code as shown on the drawings.

C. Data shall be on printed forms published by either AABC or the Contractor.

D. The test report shall include as a minimum the following information and data:

1. Motors:
   Equipment number
   Manufacturer
   Model or serial number
   Frame size
   Rated horsepower
   Rate rpm
   Corrected full load amperage
   Measured amperage and voltage
   Calculated bhp
   Measured rpm
   Sheave size, type and manufacturer

2. Fans:
   Equipment number
   Manufacturer
   Model or serial number
   Rated cfm
   Rated rpm
   Rated pressures
   Measured cfm
   Measured rpm
   Measured pressures
   Pulley size, type and manufacturer
   Belt size and quantity
3. Diffuser, Registers and Grilles:
   System identification
   Grille number
   Grille or diffuser manufacturer
   Manufacturer's model number
   ADC flow factor
   Instrument to be used with ADC flow factor
   Grille size
   Design velocity
   Design cfm
   Final measured velocity
   Final measured cfm

   E. All reports shall be certified by the Testing and Balancing Contractor that the methods used and the results achieved are as specified. In addition, each individual reporting form submitted must bear the signature and the Technician.

1.6 GUARANTEE

   A. The test and balance firm shall include an extended warranty of 90 days, after the submittal of the test and balance report, during which time the Architect, at his discretion, may request a recheck or resetting of any outlet, supply air fan, exhaust fan, or any other item listed in the test report. The firm shall provide technicians to assist the Architect making any tests he may require during this period of time.

PART 2 PRODUCTS - Not applicable for this section.

PART 3 EXECUTION

3.1 INSPECTION

   A. The Testing and Balancing Contractor shall act as an authorized inspection firm responsible to the Architect. He shall review the HVAC design drawings and shop drawings prior to fabrication and installation of the HVAC systems to insure that all of the necessary balancing equipment required is shown.

3.2 PREPARATION

   A. Coordinate Schedules with the Test and Balancing Engineer and provide sufficient time before final completion of work so that testing and balancing can be accomplished. Provide all labor and tools to make corrections to the system when required to balance the system without undue delay to the Test and Balancing Contractor. Put all equipment into full operation and continue it in operation during each working day of testing and balancing. No test and balancing work shall start
until all of the air handling equipment has new filters installed. The Test and Balancing Engineer shall be kept informed during the construction of the project of major changes made to the HVAC system. Provide the Test and Balancing Contractor with one (1) set of shop drawings on all equipment which he will be required to work on when balancing the HVAC system.

B. Shop drawings shall be submitted to the Test and Balancing Contractor. The Test and Balancing Contractor will, during the construction of the HVAC system, make job site inspections to familiarize himself with the project and shall report to the Architect items installed incorrectly or not installed in accordance with the contract drawings and specifications.

C. Work shall not begin until all systems which are to be tested have been completed and are in full working order. Put all systems and equipment into full operation and continue the operation of all equipment during each working day of the testing and balancing work.

3.3 AIR DISTRIBUTION SYSTEMS TESTING AND BALANCING

A. Utilizing the latest issue of design documents, compare the installed equipment to the design and check for completeness of the installation.

B. The system and air outlet air quantities shall be balanced to the values indicated on the drawings.

C. The grille manufacturer's outlet flow factors as determined by the ADC test code and recommended procedure for testing air outlets shall be used.

D. Prebalance equipment check:

   1. Check fan housing, ducts, duct elbows, louvers, etc., to insure they are clean and free of foreign material.
   2. Check fan and motor lubrication.
   3. Coordinate with Electrical Contractor to verify correct motor overload protectors.
   4. Check fans for proper rotation.

E. Prebalance System Check:

   1. Verify installation of all required balancing dampers. Set all systems dampers in their open position.
2. Check for air leaks at the fan and the system ductwork. Coordinate with the Contractor for repair of leaks.

3. Position all building doors and windows (if a part of system design) in their normal position.

4. Check air temperature to insure required air temperature delivery.

F. Equipment Balance:

1. Check motor amperage and voltage to insure motor is not being overloaded.

3. Determine the volume of air being delivered by the fan. Adjust the fan speed, if belt-driven, or the dampers in the system, if direct-driven, to increase or decrease the flow required. If the speed is increased, or the flow changes due to a damper adjustment, insure that the motor is not overloaded.

4. Check fan and motor speed, no-load amperage, operating amperage and voltage. Calculate brake horsepower.

5. Take fan static pressure readings.

6. Variation of air flow for all modes of operation from the design values shall be within +10 percent of design values.

3.4 OTHER EQUIPMENT TESTS

A. All equipment installed shall be tested, adjusted, and reported upon unless stated otherwise. The equipment discussed herein is not necessarily all of the equipment requiring testing.

B. Fans:

1. Record nameplate data.

2. Check belt alignment and belt tension.

3. Measure current, voltage, and speed (rpm)

END OF SECTION
230713 DUCT INSULATION

PART 1   GENERAL

1.1 WORK INCLUDED
   A. Duct Thermal Insulation
   B. Adhesives, Tie Wires, Tapes

1.2 RELATED WORK
   A. Section 230500 – Common Work Results For HVAC
   B. Section 233100 - HVAC Ducts

1.3 QUALITY ASSURANCE
   A. All insulation materials required for ductwork shall be furnished and installed under
      the contract. The execution of the work shall be by approved insulation contractor
      in strict accordance with the best practice of the trade and the intent of the
      specification.
   B. It is mandatory that all insulation be applied in a neat and workmanlike manner.
      Contractor shall be required to remove and replace all insulation not applied in strict
      accordance with the manufacturer’s specifications or not presenting a neat finished
      appearance.
   C. Ductwork insulation shall meet NFPA Standards 902 and 906 for fire resistance.

1.4 SUBMITTALS
   A. Submit product data and installation instructions in accordance with Section
      230500 – Common Work Results For HVAC.

1.5 REFERENCE STANDARDS
   A. NFPA 90A and 90B.
   B. ASTM Standard E84-75.

1.6 JOB CONDITIONS
   A. Deliver material to job site in original non-broken factory packaging, labeled with
      manufacturer’s density and thickness.
PART 2  PRODUCTS

2.1  ACCEPTABLE MANUFACTURERS

A. Materials as manufactured by Certain-Teed, Johns-Manville, Knaul, Owens-Corning, Foster Products, Childers or approved equal meeting these specifications are acceptable.

2.2  TYPE AND PERFORMANCE

A. Adhesives and Insulation Materials: Composite fire and smoke hazard ratings maximum 25 for Flame Spread and 50 for Smoke Developed. Adhesives to be waterproof.

B. Round and Rectangular Ducts: Rigid or Flexible fibrous glass insulation, 1 1/2 inch thick "K" value at 75 degrees F maximum 0.26 btu/hr./sq.ft./Deg. F/hr. with factory applied reinforced aluminum foil vapor barrier for temperatures for +40 Deg. F to +250 Deg. F services.

PART 3  EXECUTION

3.1  PREPARATION

A. Do not install covering before ductwork has been tested and approved.

B. Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application.

3.2  INSTALLATION

A. Ensure installation is continuous through inside walls. Pack around ducts with fireproof self-supporting insulation material, properly sealed.

B. Finish insulation neatly at hangers, supports and other protrusions.

C. Locate insulation or cover seams in least visible locations.

D. Concealed Ducts: Adhere flexible insulation to ductwork with adhesive applied in 6 inch wide strips on 16 inch centers. Provide 16 gage annealed tie wire tied, spiral wound or half hitched at 16 inch centers for securing duct insulation until adhesive sets. Butt insulation and seal joints and breaks [in ducts conveying air at less than room temperature] with 2 inch of foil adhered over joint.
E. Exposed Ducts: Adhere rigid insulation to ductwork with weld pins at 12 inches on center. Butt insulation and seal joints, breaks and pins with 2 inch wide adhesive backed foil tape.

F. Repair separation of joints or cracking of insulation due to thermal movement or poor workmanship.

END OF SECTION
232300 REFRIGERANT PIPING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Refrigerant Piping Systems

1.2 RELATED WORK

A. Section 230500 – Common Work Results for HVAC

1.3 REFERENCES

A. ANSI/ASTM B280 - Copper Air Conditioning and Refrigeration Tube (ACR).

PART 2 PRODUCTS

2.1 REFRIGERANT PIPING

A. Type ACR Copper tubing, hard temper with wrought copper fittings with long radius elbow.

2.2 JOINTS

A. Brazed, phos-copper alloy or bronzed, silver alloy.

PART 3 EXECUTION

3.1 INSTALLATION

A. Grade piping as necessary to facilitate oil return when required.

B. Joints shall be made up in the presence of dry nitrogen only and shall be tested before any coverings are applied. High side shall be tested at 400 psig and the low side at 250 psig.

C. All joints shall be carefully tested and if a leak is found, the joint shall be remade as described above. If no leaks are found, system shall be evacuated to a deep vacuum. Charge system as per manufacturer’s recommendation.

D. Provide 1” thick expanded rubber insulation to suction and liquid lines and paint exterior insulation with two coats of weather-resistant pigmented plasticized vinyl lacquer. Apply per manufacturer’s specifications.
3.2 TESTING

A. Test piping systems prior to the application of insulation.

B. For piping installed in concealed spaces or buried, test piping before system is concealed or backfilled.

C. After testing, and whenever conditions permit, operate systems at normal operating pressure and temperature for not less than five consecutive days. The piping systems must remain free from leaks during this period.

END OF SECTION
PART 1   GENERAL

1.1 WORK INCLUDED
A. Ductwork
B. Fasteners
C. Sealants

1.2 RELATED WORK
A. Section 230500 – Common Work Results For HVAC
B. Section 230593 - Testing, Adjusting and Balancing
C. Section 230713 - Ductwork Insulation
D. Section 233300 - Duct Liners
E. Section 233300 - Duct Accessories

1.3 REFERENCE STANDARDS
A. Fabricate in accordance with the most recent edition of SMACNA HVAC Duct Construction Standards.

1.4 DEFINITIONS
A. Duct Sizes: Dimensions shown on the Drawings are sheet metal sizes.

PART 2   PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Products manufactured by the following manufacturers meeting these specifications are acceptable.
B. Flexible ducts manufactured by Thermaflex, Wire Mold, Certain Tweed and ATCO are acceptable.

C. Round and oval ductwork manufactured by United Sheet Metal, Semco, General Metals, Spiro-Fab and Metal Manufacturing are acceptable.

2.2 MATERIALS

A. Galvanized Ductwork: Galvanized steel lock forming quality having zinc coating of 1.25 ounces per square foot for each side per ASTM A525 G90. All ductwork shall be galvanized unless otherwise noted.

B. Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts.

C. Sealant: Water resistant, fire resistive, compatible with mating materials.

D. Flexible Ducts: UL 181 Class 1 airduct consisting of inner vapor barrier supported by a helically wound steel wire; wrapped with 1-1/2” thick flexible fibrous glass insulation, enclosed by a reinforced foil outer jacket. Ductwork shall be a factory fabricated assembly with hanger tab support system equal to CertainTeed Certaflex 25.

2.3 FABRICATION

A. The contractor shall visit the premises and thoroughly familiarize himself with all the details of the work and working conditions and to verify all dimensions in the field prior to fabricating ductwork. The contractor shall advise the Architect of any discrepancy prior to fabrication.

B. Size round ducts installed in place of rectangular ducts from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

C. Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

D. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on center line. Where not possible and where rectangular elbows used, provide single thickness type turning vanes.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Maximum divergence upstream of equipment to be 30 degrees and 45 degrees convergence downstream.
F. Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate, or sag. Seal all duct joints and connections with "hard cast" tape sealant or equal as ducts are being assembled.

2.4 DUCT GAUGES AND REINFORCEMENT

A. Provide minimum duct wall thickness and reinforcement as required by the latest edition of the SMACNA HVAC Duct Construction Standards.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage.

B. Seal all transverse joints with Hard Cast or equivalent.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. At each point where ducts pass through partitions, seal joints around duct with non-combustible material. Provide sheet metal closure around opening when exposed.

E. Paint all exposed ductwork as directed by architect.

END OF SECTION
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233300  DUCT ACCESSORIES

PART 1   GENERAL

1.1   WORK INCLUDED

A. Access Doors

C. Balancing Dampers

E. Flexible Connections

F. Turning Vanes

1.2   RELATED WORK

A. Section 230500 – Common Work Results For HVAC

B. Section 230593 - Testing, Adjusting and Balancing

C. Section 233100 - HVAC Ducts

D. Section 233713 - Diffusers, Registers & Grilles

E. Section 233353 – Duct Liners

1.3   QUALITY ASSURANCE

A. Accessories shall meet the requirements of NFPA 90A, Air Conditioning and Ventilating Systems as applicable.

B. Fabricate in accordance with ASHRAE handbooks and SMACNA duct manuals.

1.4   SUBMITTALS

A. Submit product data in accordance with Section 230500 – Common Work Results For HVAC

PART 2   PRODUCTS

2.1   ACCEPTABLE MANUFACTURERS

A. Products manufactured by Air Balance, Greenheck, DuroDyne, Penn, Krueger, Safe Air, Dowco or Ruskin meeting these specifications are acceptable.

2.2   ACCESS DOORS

233300 DUCT ACCESSORIES
A. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For internally lined or insulated ductwork, install minimum one inch thick insulation with sheet metal cover.

2.3 DAMPERS

A. Fabricate counter balanced backdraft dampers with blades a maximum 8 inch width having felt or flexible vinyl sealing edges, linked together in rattle-free manner and width adjustment device to permit setting for varying differential static pressure.

B. Fabricate balancing dampers of galvanized steel, minimum 16 gauge and provide with locking quadrants. Damper controllers shall be raised for insulated ducts.

2.4 FLEXIBLE CONNECTION

A. Fabricate of neoprene coated flameproof fabric approximately 4 inch wide tightly crimped into metal edging strip and attach to ducting and equipment by screws or bolts at 6 inch intervals.

2.5 TURNING VANES

A. Fabricate turning vanes and rails of 24 gauge galvanized steel and assemble rattle free.

B. Turning vanes shall be single thickness prefabricated or assembled per manufacturer's instructions for optimum shape.

C. Secure to duct with sheet metal screws, rivets or weld. Final assembly shall be rattle free.

2.6 APPLICATION

A. Provide access doors for inspection and cleaning at filters, fans, and as indicated on the drawings. Review locations prior to fabrication.

B. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing and where indicated on the drawings.

C. Provide flexible connections immediately adjacent to equipment, in ducts associated with fans, equipment subject to forced vibration and as shown on the drawings.

PART 3 EXECUTION
3.1 INSTALLATION

A. Install items in accordance with manufacturer’s printed instructions and SMACNA Standards.

B. For connections to fans, install 1/2 inch thick neoprene pad over fabric and hold in place with additional metal strips.

END OF SECTION
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PART 1 GENERAL

1.01 WORK INCLUDED
   A. Duct Lining

1.02 RELATED WORK
   A. Section 230500 – Common Work Results For HVAC
   B. Section 233100 - HVAC Ducts

1.03 QUALITY ASSURANCE
   A. International Mechanical Code and Local Codes
   B. ASTM E-84 and NFPA 90A for Fire Hazard Classification
   C. ASTM D 903 for Adhesive Bonds

1.04 REFERENCE STANDARDS
   A. TIMA AHC-101
   B. ASTM C-423-77 for Sound Absorption
   C. ASTM C-177 for Thermal Conductance
   D. SMACNA Duct Liner Application Standard

1.05 SHOP DRAWINGS
   A. Submit product data and installation instructions in accordance with Section 230500 – Common Work Results For HVAC.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS
   A. Products manufactured by Johns-Manville, Owens-Corning or CertainTeed meeting these specifications are acceptable.

2.02 MATERIALS
A. All rectangular supply and return ductwork shall be provided with Type 1 flexible duct liner, 1" thick, 1-1/2 lbs. per cubic foot density "K" value at 75 degrees F mean temperature of 0.26 BTU/in/sq. ft./degrees F/hr., suitable for temperature range of 40 degrees F to 250 degrees F and maximum velocity of 4000 fpm.

B. Weld pins or approved equal mechanical fasteners capable of withstanding 50 lb. tensile load test.

C. Adhesives meeting FM, UL and NFPA requirements for fire and smoke ratings, maximum 25 flame spread and maximum 50 smoke developed. Adhesives shall conform to Adhesive and Sealant Council Standards for Adhesives for Duct Liner ASC-A-7001C-1972.

D. Material surfaces shall be determined to be resistant to mold growth in accordance with UL 181, ASTM C1338, or ASTM D3273.

PART 3  EXECUTION

3.01  INSTALLATION

A. All duct designated to receive liner shall be completely covered with liner. Transverse joints shall be neatly butted and there shall be no interruptions or gaps. The black coated surface of the duct liner shall face the air stream. Provide 26 gauge galvanized steel "Z" strip at leading edge of duct liner.

B. Duct liner shall be adhered to sheet metal with mechanical fasteners and 100% coverage of adhesive. Transverse edges of liner to be coated with adhesive. Duct liner shall be cut to assure overlapped and compressed longitudinal corner joints.

C. For velocities up to 2,000 feet per minute, fasteners shall start within 3" of the upstream transverse edges of the Duct Liner and 3" from the longitudinal joints and shall be spaced at a maximum of 12' o.c. around the perimeter of the duct, except that they may be a maximum of 12" from corner break. Elsewhere they shall be a maximum of 18" o.c. except that they shall be placed no more than 6" from a longitudinal joint of the liner nor 12" from a corner break.

END OF SECTION
233713 DIFFUSERS, REGISTERS & GRILLES

PART 1   GENERAL

1.1 WORK INCLUDED

A. Supply, Return, Transfer and Exhaust Air Devices and Accessories.

1.2 RELATED WORK

A. Section 230500 – Common Work Results For HVAC

1.3 QUALITY ASSURANCE

A. Make air flow tests and sound level measurement in accordance with applicable ADC equipment test codes and ASHRAE standards.

B. Manufacturer shall certify cataloged performance and ensure correct application of air outlet types.

1.4 SUBMITTALS

A. Submit in accordance with Section 230500.

B. Submit product data and shop drawings covering each item together with schedule of outlets, listing cfm, neck velocity, NC level and Ak factor and air flow measurement procedures.

1.5 JOB CONDITIONS

A. Review requirements (including architectural drawings) of outlets as to size, finish, and type of mounting prior to submitting shop drawings and schedules of outlets.

PART 2   PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products manufactured by Krueger, Titus, Price or Nailor, meeting these specifications are acceptable.

2.2 GENERAL REQUIREMENTS

A. Provide air devices equal in all respects to those scheduled on the drawings.

B. Rate units in accordance with ADC standards.
C. Base air outlet application on space noise level of NC 35 maximum in all areas unless indicated otherwise on drawings.

D. Provide supply outlets with sponge rubber seal around edge.

E. All devices shall be factory finished.

F. When required provide air devices factory installed in metal panels painted to match air device finish. Panel shall be suitable for insertion into lay-in-tile ceilings.

PART 3   EXECUTION

3.1   INSTALLATION

A. Install items in accordance with manufacturer’s printed instructions.

B. Paint ductwork visible behind air outlets matt black.

C. Seal square to round adaptors or lined plenum boxes shall be seal airtight to diffusers and grilles.

C. When required cut metal panels for insertion in ceiling at grid location where tiles may be less than nominal size. Center diffuser or grille within modified panel.

END OF SECTION
236313 AIR COOLED HEAT PUMPS

PART 1 GENERAL

1.1 WORK INCLUDED
   A. Air-Cooled Heat Pumps

1.2 RELATED WORK
   A. Section 230500 – Common Work Results for HVAC
   B. Section 230593 – Testing, Adjusting & Balancing For HVAC
   C. Section 238219 – Fan Coil Units
   D. Division 26 – Electrical Requirements

1.3 REFERENCE STANDARDS
   A. Unit shall be U.L. Listed.
   B. Unit shall be certified in accordance with ARI Standard 240 and 270.

1.4 SUBMITTALS
   A. Submit product data in accordance with Section 230500.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
   A. Products manufactured by Trane, Carrier, Lennox, or JCI are acceptable provided they meet or exceed these specifications.
   B. Heat pump and matching fan coil unit shall be products of the same manufacturer.

2.2 PERFORMANCE
   A. Heat pump performance, when matched with associated fan coil unit, shall meet or exceed performance scheduled on the drawings.
   B. Verify with manufacturer that refrigerant piping sizes connecting fan coil unit to condensing unit are adequate to insure performance scheduled on the drawings.
2.3 GENERAL

A. Unit shall be factory assembled and tested, suitable for connection to a remote DX fan coil unit. Unit shall contain compressor(s), plate fin condenser coil, fan, motors and controls. System shall operate using refrigerant R-410.

2.4 DESIGN AND CONSTRUCTION

A. Casing shall be constructed of minimum 18 gauge galvanized steel. Exterior surfaces shall be finished with weather-resistant baked enamel finish. Casing shall have removable panels to allow for easy service of all major components.

B. Compressor shall be direct drive hermetic reciprocated type with centrifugal oil pump provided for lubrication of moving parts. Provide crankcase heater, internal spring isolation and sound muffling device.

C. Condenser coil shall be 3/8" copper tubes mechanically bonded to aluminum plate fins. Coil shall be factory pressure and leak tested. Condenser fan(s) shall be direct drive propeller type, statically and dynamically balanced. Fan motor shall be permanently lubricated totally enclosed type.

D. Provide all necessary refrigeration system components including but not limited to expansion valve, filter drier and service valves and gauge ports.

E. Safety and operating controls shall include but not be limited to compressor and fan motor overloads, high and low pressure cut-off devices, defrost control, low ambient operation (allows operation to 20 degrees), anti-recycling control and all necessary fusing. Provide 24-volt control system including control power transformer, fuses, relays and all other required devices.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install unit as per manufacturer's instructions.

B. Insure that exact location of condensing unit has adequate clearance for air flow and servicing as per manufacturer's specifications.

END OF SECTION
237100 EVAPORATIVE COOLERS

PART 1  GENERAL

1.1  WORK INCLUDES

A.  Evaporative Coolers

1.2  RELATED WORK

A.  Section 230500 – Common Work Results for HVAC
B.  Section 230593 – Testing, Adjusting & Balancing For HVAC
C.  Section 233113 – Ductwork
D.  Division 26 – Electrical Requirements

1.3  QUALITY ASSURANCE

A.  Unit shall be tested, rated and certified to meet AMCA Standard 210.
B.  Motor and pump shall be UL listed.

1.4  SUBMITTAL

A.  Submit Manufacturer's performance data as required by Section 230500.

PART 2  PRODUCTS

2.1  ACCEPTABLE MANUFACTURERS

A.  Products manufactured by Aerocool or approved equal meeting these specifications are acceptable.

2.2  PERFORMANCE

A.  Cooler performance shall meet or exceed that scheduled on the drawings.

2.3  CONSTRUCTION

A.  Unit casing shall be constructed of heavy gauge galvanized steel. Provide polybond epoxy coating for corrosion protection.
B. Intake Louvers shall be galvanized steel. Provide polybond epoxy coating for corrosion protection. Louvers shall house cooling media.

C. Cooling media shall be [aspen fiber excelsior] [minimum 8" thick corrugated cellulose material, impregnated with insoluble anti-rot salts and rigidifying saturants. Minimum adiabatic efficiency at 600 fpm velocity shall be 76% with no entrainment of pad water into fan section].

2.4 FAN AND PUMP

A. Fan shall be heavy duty moisture resistant forward curved centrifugal type, statically and dynamically balanced.

B. Pump shall be encased in corrosion-resistant, flame retardant plastic.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install evaporative cooler in accordance with manufacturer’s instructions and as indicated on the drawings.

B. Provide bleed line from cooler to drain.

C. Install line voltage controls as per Division 26 requirements.

END OF SECTION
238219 FAN COIL UNITS

PART 1  GENERAL

1.1  WORK INCLUDED

A. Direct Expansion Fan Coil Units

1.2  RELATED WORK

A. Section 230500 – Common Work Results for HVAC

B. Division 26 – Electrical Requirements

1.3  QUALITY ASSURANCE

A. Provide fans bearing AMCA certified rating seal.

1.4  SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 230500.

B. Submit fan curve or table showing fan performance with system operating point plotted on curves.

C. Submit dimensioned data.

D. Submit manufacturer’s installation instructions and maintenance and operating procedures.

1.5  REFERENCED STANDARDS

A. UL listed.

B. ARI Standard 210 & 240.

PART 2 - PRODUCTS

2.1  ACCEPTABLE MANUFACTURERS

A. Units manufactured by Trane, Carrier, Lennox, JCI or approved equal meeting these specifications are acceptable.

2.2  PERFORMANCE
A. Unit shall meet or exceed the performance schedule on the drawings.

2.3 CONSTRUCTION

A. Unit casing shall be galvanized steel with baked enamel finish. Provide insulation layer within unit.

B. Fan shall be forward curved, centrifugal type statically and dynamically balanced. Provide belt drive as indicated on drawings. Fan and motor bearings shall be permanently lubricated type. Provide motor with thermal overload protection.

C. Evaporator coil shall be constructed of copper tubes mechanically bonded to aluminum fins, factory pressure and leak tested at 375 psig. Provide factory installed thermal expansion valve. Condensate drain pan shall be constructed of PVC plastic or continuously welded galvanized steel.

D. All necessary controls and safety devices shall be factory installed and wired.

E. Air filter has to be one inch disposable, medium efficiency, pleated type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install unit as per manufacturer’s instructions.

B. Provide and install all interconnecting wiring, piping, etc. between fan coil unit and matching heat pump.

C. Install new disposable filters before system start-up.

END OF SECTION
END OF DIVISION
DIVISION 26 - ELECTRICAL

260500 ELECTRICAL

1.1 GENERAL:

A. Drawings, Section I - Legal Documents and Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

A. Includes all labor, material and equipment required to furnish and install a complete electrical system as shown on the drawings and as specified herein.

B. Work includes but is not necessarily limited to the following:

(1) Panel distribution feeders, distribution equipment, panelboards, overcurrent protection, etc.
(2) Wiring for light and power to all outlets, devices, controls and equipment.
(3) Lighting fixtures as specified, complete with lamps, lenses and necessary hardware.
(4) Final connections of equipment specified or furnished under other divisions of this specification.
(5) Demolition of existing electrical systems to the extent indicated or required.

Cutting and patching as necessary to install electrical work.

C. Omission of express reference to any material or labor necessary for or incidental to a complete installation shall not be construed as releasing Contractor from furnishing such material and labor. The electrical system as installed shall be complete and functional with all electrical items in operable condition.

D. This contract shall include all contingencies which may arise and may be required by alteration and demolition work. This shall include necessary removal, relocation or extending of existing electrical outlets, conduit, wiring and equipment and any necessary splicing, extending or reconnecting of existing conduit and wiring systems. Existing-to-remain systems and wiring disturbed or interrupted shall be reconstructed to maintain original operation.
E. Carefully examine the building site and compare the drawings with existing conditions. Further, verify utility requirements with the proper utility companies involved. By the act of submitting a bid, the Contractor shall be deemed to have made such examination and to have accepted such conditions, and to have made allowance therefore in preparing this bid.

F. Coordination with other trades and equipment: Coordinate location, electrical characteristics and required electrical hook-up/connections for equipment and systems provided in Contract by other trades or provided by Owner. Such coordination shall be done prior to rough-in of electrical outlets and circuits. Locate and provide all such electrical connections and hook-ups to properly accommodate the equipment being supplied.

G. Construction Power Electrical Service:

(1) Make all necessary arrangements, apply for all permits, and provide all temporary electrical service and lighting required for construction purposes during the entire period of construction.
(2) Coordinate with all trades and provide temporary lighting and power adequate for construction.
(3) Comply with all applicable OSHA and NFPA-70, National Electrical Code requirements for temporary wiring at construction sites.
(4) Existing power service, panelboards, etc. may be used as source for construction power so long as continuity of service to other connected loads on the system is maintained. Verify point of connection with Engineer prior to connecting any temporary power feeders or panelboards.

H. Permanent Utility Services:

(1) Existing to remain.

I. Demolition:

(1) Demolition when indicated or required shall be complete. Do not abandon equipment, wiring or conduits. Concealed conduits, not exposed by demolition, may be abandoned.
(2) Removed equipment shall salvage to Contractor, unless otherwise indicated. Removed materials shall be removed from site and disposed of in a legal manner.
(3) Fluorescent lamp and ballast disposal shall be done in accordance with all local, State and Federal regulations pertaining to the disposal of such materials.

1.3 DRAWINGS
A. The architectural drawings take precedence over the electrical drawings in the representation of the general construction work and the drawings of the various trades take precedence in the representation of the work of those trades.

B. For the purpose of clearness and legibility, the electrical drawings are essentially diagrammatic. The size and location of equipment is shown to scale whenever possible, but Contractor shall make use of all the data in the contract documents to properly locate all electrical equipment.

(1) Refer to Architectural Reflected Ceiling Plan for exact location of ceiling mounted lighting fixtures, lighting control sensors, heat and smoke detectors, loud speakers and similar equipment which are mounted on ceiling. When such equipment is not indicated on the Architectural Plans, then devices shall be located where indicated on the Electrical Plans.

(2) When Architectural Interior or Millwork Elevations show electrical outlets, the locations on such elevations shall define the exact location of the outlet.

(3) Maintain Code clearances about electric equipment.

(4) Locations and mounting heights of outlets and operating controls on equipment shall comply with the requirements of the American’s with Disabilities Act, as amended.

(5) Although the drawings are diagrammatic and the exact location and routing of circuits is not indicated, it is intended that the point-to-point connections of the circuits as shown on the electrical plans be adhered to.

(6) When circuits or conduits are indicated to be installed above the floor (by being drawn with solid lines), they shall not be changed to be run under floor inside the building. When specifically indicated (by dashed lines) circuits in approved raceways shall run under floor inside the building.

(7) When electrical plans do not indicate specific point to point wiring of circuits, then Contractor shall install circuits in the most feasible manner. All such point-to-point wiring connections shall be indicated on the record drawings.

(8) In the event that Contractor proposes to deviate from layouts as indicated, submit for prior approval before making any changes. Shop drawings showing the proposed changes may be required. All such changes shall be approved and be recorded in the record drawings.

1.4 CODES AND STANDARDS

A. All electrical equipment, materials and method furnished and installed shall comply with the 2017 edition of NFPA-70 National Electrical Code as adopted by the legally constituted Authorities Having Jurisdiction (AHJ),
including all local ordinances, safety orders of the State Division of Industrial Safety, and State and local Fire Marshals. All code references in the Contract Documents (Drawings, Specifications, Addenda, Change Orders, etc.) are to the current adopted edition of the Code in the jurisdiction where the work is performed.

B. Materials shall be listed by a nationally recognized testing laboratory which is accepted by the AHJ, such as Underwriter's Laboratories, Inc. (UL), ETL, or other approved, where such a listing exists for that style or general arrangement of equipment. Equipment shall be installed and connected in compliance with all the listing instructions.

C. It is recognized that Codes specify minimum standards, and whenever the Contract Documents call for materials, workmanship, arrangement or construction of quality or standard higher than Code, the Contract Documents shall take precedence. In the event that the contract documents call for a quality or standard lower than Code, then Code requirements shall govern.

1.5 PERMITS AND INSPECTIONS

A. Refer to Division 1 for Permits.

B. All work shall be subject to the inspection of the AHJ and Owner or Owner's Agent. No work shall be covered or concealed in any way prior to inspection and approval by the proper authorities. Should uninspected work be covered, Contractor shall, at no cost to Owner, uncover all such work and, after it has been inspected and approved, repair all damage done in a manner satisfactory to the Architect.

1.6 APPROVAL OF MATERIALS

A. For convenience in designation, certain materials are specified by manufacturer's name and catalog number. Alternative materials and equipment which is of equal capacity, style, size and quality as that specified may be used subject to the approval of the Architect. The burden of proof as to the comparative suitability of the alternate equipment shall be upon the Contractor. Provide all information, demonstrations, and samples necessary or related hereto as required by the Architect. The Architect shall be the sole judge in such matters and his decision shall be final.

B. Requests for approval of alternate material or method shall be submitted to the Architect in accordance with Division 1 requirements for approval of materials.
C. Where the use of alternate materials results in a change of arrangement, location or size from that indicated on the drawings, Contractor shall submit for approval shop drawings showing the proposed changes.

D. Verify availability of all equipment and materials proposed for use in execution of Contract prior to submitting same for approval. Discontinuance of production of any equipment or materials shall not relieve Contractor from furnishing and installing approved alternate equipment and/or materials of equal quality and style without additional cost to Owner.

1.7 SUBMITTALS

A. Before starting work, submit shop drawings and/or product literature for at least the materials listed below:

- Panelboards -- shop drawings
- Motor Controls -- product literature
- Safety Switches and Disconnects -- product literature
- Switches, Receptacles and Device Cover Plates -- product literature
- Lighting Fixtures -- shop drawings
- LED lamp drivers (if specified or described separate from light fixtures) -- product literature
- LED lamps (if specified or described separate from light fixtures) -- product literature
- Nameplates and Engraved Cover Plates -- schedule describing all types
- Control Systems -- shop drawings

B. Submittals shall be in accordance with Division 1 requirements for submittals.

C. Do not include operating, maintenance or repair manuals in the product submittals unless specifically requested.

D. All electrical submittals shall be made at one time. Incomplete or partial submittals will not be accepted.

E. Re-submittals shall not include material which was previously reviewed and approved.

F. Shop drawings larger than 11" x 17" paper size shall be prepared using the same size drawing sheet as the bid/construction documents.

1.8 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Prepare four (4) complete sets of Maintenance and Operating Instructions which cover electrical systems and equipment furnished and installed for this project.
B. Include all published literature which is provided by the equipment manufacturer. As a minimum, the following shall be provided:

1. Instruction sheets or manuals
2. Repair manuals
3. Spare parts lists
4. Wiring Diagrams
5. Manufacturer's warrantee information
6. Other written material or drawings furnished with or packed with the products.
7. Manufacturer and Catalog Number of all ballasts and lamps.
8. Copy of coordination study (when required for adjustable trip circuit breakers and ground fault protection).

C. Do not include copies of the electrical product submittals in the O & M material. Only submit material described in 1.8 B. 1 thru 8 above.

D. Assemble each set of Maintenance and Operating Instructions into 3-ring binder.

E. Provide table of contents and tab separators to organize the manual by specification section and product type.

F. Provide a copy of the product submittals in a separate binder labeled: "Electrical Products Submittals."

1.9 RECORD DRAWINGS

A. Provide and keep up-to-date one (1) separate complete and legible "as-built" set of drawing prints, corrected daily and showing every change from the original drawings and specifications, exact "as-built" location, size and kind of fixture, runs of wire and conduit, location of pull and junction boxes, and other equipment as actually installed. In addition, items changed or deleted by addendum or change orders shall be indicated. This drawing shall be kept on-site and used only as a record set. This set shall not be used for construction purposes.

B. In each section of the record drawings and specifications the manufacturer's name, product name, and catalog number for each product used shall be indicated. When the bid documents indicate more than one name or catalog number for a product, the products not used shall be deleted from the record drawings so that only the exact products used are the only types described on the record drawings.
C. Addenda, Change Order and Clarification drawings issued for construction during the course of the work shall be drawn on to the record drawings at the correct location and on the correct drawings.

D. Changes as shown on corrected drawing prints shall be professionally drawn in accordance with Division 1 requirements. Such drawings shall be accurate and will provide a record for future maintenance and service.

1.10 MASTER KEYING

A. For equipment such as panelboards and equipment cabinets which are supplied with integral locks, all such locks shall be keyed alike. Furnish three (3) sets of keys for each lock.

B. For equipment such as outdoor switchboards and safety switches provide provisions for padlocking for all such equipment with direct access by the public. Provide Master Model 3 padlocks for all such equipment. In addition on safety switches and similar equipment provide one padlock for unit cover and one padlock to lock switch handle on. All padlocks keyed alike, unless specifically indicated otherwise.

C. All keys shall be identified as to the locks which they operate.

D. When key switches are used, all such switches shall use same key.

1.11 IDENTIFICATION

A. For switchboards and panelboards, provide nameplates for each section or panelboard stating the section name and voltage. Each circuit breaker and fused switch in distribution panelboards or switchboards shall have a nameplate indicating the load served.

B. Individual safety switches, disconnect switches, starters, contactors, time-switches, etc. shall have nameplates describing the load served.

C. Switches for lights installed remote from the switch location shall have engraved cover plates provided.

D. Control switches for mechanical and other equipment shall be identified by engraved cover plates or nameplates attached to the switch.

(1) Describe the load controlled.
(2) Describe the power source feeding the equipment.
(3) Engraved cover plates shall be factory machine engraved and shall have black enamel filled lettering.
(4) Nameplates shall be engraved bakelite type.
(5) Applies to all switches except light switches.
E. Nameplates as specified above shall be constructed of laminated plastic.

(1) Use white-black-white color laminated plastic.
(2) Lettering shall be 3/16" high (or larger when called for on drawings) cut through white layer of bakelite to reveal black layer.
(3) All nameplates shall be screwed or riveted to the equipment. Adhesive attachment is not acceptable.

F. Provide circuit directories for all branch circuit and distribution panelboards. Directories shall describe the destination of and uniquely identify each and every circuit or feeder. Comply with NFPA-70 National Electrical Code section 408.4 (A).

G. Identify source of supply for all switchboards, panelboards and transformers in accordance with NFPA-70 National Electrical Code section 408.4 (B). On panelboards with circuit directory cards, the source of supply shall be indicated on the directory. On switchboards or distribution panelboards having individual load circuits identified by nameplates, provide a nameplate on the equipment indicating source of supply.

H. Switchboards, panelboards and other distribution equipment shall be provided with additional marking or identification as required by NFPA-70 National Electrical Code sections 110.21, 110.22, 110.24 (A), and 110.24 (B).

I. Home run junction boxes and pull boxes located above accessible ceilings and exposed in unfinished spaces shall have panel name and circuit numbers written on the box cover. Use waterproof marking pen, 1" high lettering.

J. Switchboards, Panelboards, industrial control panels and Motor Control Centers shall be field marked to warn qualified persons of potential electric arc flash hazards in accordance with NFPA-70, Article 110.16. Warning labels shall comply with ANSI Z535.4-2017 requirements.

1.12 COOPERATION WITH OTHERS

A. Work shall proceed so that it will harmonize with that of other trades. All work shall coordinate with other trades and Contractor is responsible for correct placing of work in proper location to avoid conflict.

1.13 PRELIMINARY OPERATION

A. Owner may require operation of any portion of systems or equipment prior to final completion and acceptance of work. Such preliminary operation shall not be construed as an acceptance of any work.
B. Contractor shall become familiar with the requirements and schedule for construction phasing and shall comply as required to have Electrical systems operational at the appropriate time. It may be necessary for electrical work to be completed ahead of other trades or ahead of the scheduled completion of a given area of the building in order to make the work functional in a preceding phase of work.

1.14 CHANGES AND ADDITIONAL WORK
A. Changes shall not be made from the work as indicated except on written order of Architect, stating change to be made for the work.

1.15 PROTECTION
A. Materials, equipment, etc., including those furnished by others that are to be installed by this contractor shall be received and properly protected from damage.

1.16 GUARANTEE
A. Refer to Division 1 for warranty requirements.
B. LED lamps and LED drivers shall be warranted for at least two (2) years, including material and labor to replace defective products.
C. When manufacturer’s warranty for any equipment supplied exceeds the warranty as described in Division 1 the full manufacturer’s warranty shall apply to this work.

PART 2 PRODUCTS
2.1 GENERAL
A. Except as specifically noted, materials shall be new, full weight or size, standard in every way, the best quality of their respective kinds, and satisfactory to the Architect.
B. Equipment and Materials shall be suitable for use intended (i.e. weatherproof enclosures for exterior or wet locations, proper voltage ratings for fuses and safety switches, etc.).

2.2 RACEWAYS
A. Rigid Metallic Conduit:
B. Intermediate Metal Conduit (IMC):

(1) Hot dipped galvanized or sherardized. Minimum size is 3/4 inch trade size.

(2) Fittings installed underground, in wet locations or exposed outdoors shall be threaded type -- no set screw or compression types.

(3) Fittings installed indoors where otherwise impracticable to install threaded type fittings shall be permitted to be steel compression type. Other indoor locations shall use threaded type fittings.

(4) IMC installed underground or in concrete slabs on grade shall be protected from corrosion as specified above for Rigid Metallic Conduit.

(5) IMC shall be permitted to be used for raceways for all wiring systems at any location concealed or exposed (exposed wiring only when specifically permitted) except IMC shall not be used in hazardous locations or when drawings indicate use of a different type of raceway for the specific run.

C. Electrical Metallic Tubing (EMT):

(1) EMT shall be hot dipped galvanized or sherardized. Minimum size is 1/2 inch trade size.

(2) EMT may be used concealed in attic, furred spaces and stud walls.

(3) EMT may be used for vertical runs in masonry and brick but shall not be used for horizontal runs in masonry or brick. EMT shall not be used embedded in poured concrete. Vertical runs of EMT shall be permitted to be embedded within concrete filled cells of masonry units or concrete bond beams or similar construction.
(4) When exposed raceway is permitted, EMT may be used only where not subject to physical damage.

a. Do not use exposed EMT above roofs.
b. Do not use exposed EMT in any location subject to severe physical damage such as loading docks or locations exposed to vehicular traffic.
c. In such locations exposed raceways shall be rigid steel or IMC raceways with threaded fittings.

D. EMT Fittings and Connectors:

- (1) Appleton, Crouse-Hinds or Thomas & Betts.
- (2) In concealed work use steel set screw or compression type fittings. Do not use die cast or pot metal type.
- (3) In exposed work use only steel compression type fittings for sizes 2 inch and smaller (steel set screw fittings are acceptable only for exposed runs of 2 1/2 inch and larger EMT).
- (4) Use insulated throat connectors except when insulated bushings are used.

E. Rigid Non-Metallic Conduit (PVC):

- (1) Heavy wall schedule 40 or of type as noted on drawings. Minimum size is 3/4" trade size.
- (2) Fittings used with PVC shall be cement-on style, rated for same operating temperature as the conduit.
- (3) PVC may be used for underground conduit runs both outside and under floor inside building. PVC shall not be used anywhere above grade or exposed. Use Rigid Metallic Conduit for penetrations through concrete slabs from PVC below. For pulls over 25' long, bends and elbows in PVC system shall be rigid steel, with appropriate coupling to PVC or they shall be concrete encased.
- (4) Provide concrete encasement for PVC only when indicated. Concrete encasement shall cover conduits minimum of 3" on all sides. Provide plastic conduit supports as necessary for duct alignment in concrete encased duct banks.

F. Flexible Metallic Conduit (Greenfield):

- (1) Greenfield connectors shall be screw clamp type -- no twist-in connectors allowed. Do not use 90 degree flex connectors without prior approval.
- (2) Use only steel flex conduit, not aluminum. Minimum size shall be 1/2" except 3/8" may be used for light fixture whips.
- (3) Greenfield shall be used in lengths not to exceed 3'-0". Use only indoors in dry locations.
(4) Fixture whips up to 6'-0" long may be used to connect lay-in type lighting fixtures. Connectors on flex whips shall be screw clamp type. (In general, light fixture manufacturer's standard flex connectors are not acceptable.)

G. Liquid-Tight Flexible Conduit (Liquid-Tight Flex):

(1) Non-metallic type, Carlon Carflex or approved equal.
(2) Connectors shall be weatherproof compression type.
(3) Minimum size 1/2" trade size, larger sizes when required for conductor fill.
(4) Liquid-tight flex shall be used in lengths not to exceed 3'-0".
(5) Do not use metal core Liquid Tight Flexible Metallic Conduit.

H. Special Raceways: As indicated.

2.3 OUTLET BOXES AND JUNCTION BOXES

A. Galvanized code gauge steel construction for concealed work.

B. Size in accordance with Articles 312 and 314 of NFPA-70 National Electrical Code.

C. Provide plaster rings or tile covers of proper gang as required.

D. Minimum size for any outlet is 4" sq. x 1-1/2" deep or larger when required with appropriate plaster ring.

E. Use cast aluminum type boxes (Bell Boxes) and matching cover plates for surface outlets, switches, etc. in exposed work and for surface or flush weather-proof locations. Use Pass & Seymour WPB series in 1-gang, 2-gang and 3-gang configurations or equivalent by other manufacturers. (Above 8'-0" A.F.F. stamped steel boxes may be used in interior locations when exposed except when surface metal raceways are used.)

F. Floor boxes shall be Walker type MP-880 series or equal Hubbell or Steel City type with matching flush brass covers. Provide brass carpet flanges in carpet areas. Special multi-gang, raised or recessed below floor outlets shall be as indicated.

G. Boxes for junctions, outlets and switches fed by surface metal raceways shall be matching Wiremold or equal to match raceway.

H. Flush in-ground pull or splice boxes shall be fiberlyte non-metallic type Christy Concrete Products or approved equal.

(1) Size E3.5 box provide type FL09TBOX with matching bolt-on lid.
(2) Size E5 box provide type FL30TBOX18 with matching bolt-on lid.
(3) Size E7 box provide type FL36TBOX18 with matching bolt-on lid.
(4) Lids shall be marked “Electrical” or “Communications” to correspond with circuits installed in the box.

2.4 CONDUCTORS

A. Unless indicated otherwise, all conductors shall be insulated, 98% minimum conductivity copper.

(1) Minimum size for lighting and power circuits is No. 12 AWG, provide larger size when indicated or required.
(2) Fixturewhips and internal wiring in light fixtures shall be No. 18 AWG minimum, unless larger size indicated.
(3) Minimum size for fire alarm circuits is No. 14 AWG, solid copper conductor.
(4) Minimum size for controls is No. 14AWG, stranded or solid copper conductor when overcurrent protection on control circuit does not exceed 15 amperes.
(5) Aluminum conductors shall be used only on specific, indicated feeders and circuits.

B. Conductors construction:

(1) No. 10 AWG and smaller solid copper conductor.
(2) No. 8 AWG and larger for general wiring stranded copper conductor.
(3) No. 8 - 2 AWG exposed grounding conductors solid copper conductor.
(4) Aluminum conductors No. 1 AWG and larger compact stranded aluminum alloy AA-8176 conductor.

C. Conductor insulation:

(1) No. 12 - 8 AWG in wet or dry locations: "THHN or THWN" or "THWN-2".
(2) No. 6 AWG and larger in wet or dry locations: "THHN or THWN", "THWN-2", "XHHW" or "XHHW-2".
(3) Special conductor insulation as noted.

D. Color code all conductors. Use colored insulation (not colored tape) for sizes No. 6 AWG and smaller. Use colored tape at all terminations, junction and pull boxes, etc., for sizes No. 4 AWG and larger.

(1) 208Y/120V three phase system -- Neutral White, Phase A Black, Phase B Red, Phase C Blue, Ground Green.
E. Types AC and MC cables:

(1) Aluminum or steel interlocking armor jacket and THHN insulated copper conductors may be used for 20A and smaller rated branch circuits.

(2) In medical treatment areas requiring redundant grounding per NFPA-70 National Electrical Code section 517.13 ‘medical’ rated type AC cables shall be used.

(3) AC and MC cable fittings shall be listed and approved for the purpose.

2.5 WIRING DEVICES

A. Catalog numbers listed below are for Pass & Seymour wiring devices. Equal products as manufactured by Bryant, Cooper, Hubbell and Leviton are acceptable.

B. Color of all devices shall be brown unless otherwise indicated. Occupancy sensor wall box control devices which are not manufactured in brown color shall be provided with gray color.

C. Toggle Switches:

(1) Single pole, double pole, 3-way, 4-way Extra Heavy Duty Specification Grade 20A 120/277V # PS20AC1, PS20AC2, PS20AC3, PS20AC4 respectively.

(2) Lighted handle type # PS20AC1-CSL single pole or # PS20AC3-CSL 3-way. Handle glows when switch is off. Use clear handle type switch when normal wiring device color is any color except white or ivory. When white or ivory color is specified for the normal devices then provide Lighted Handle switches with white or ivory color handle to match the other wiring devices.

(3) Pilot light type # PS20AC1-CPL (120V, 1-pole), PS20AC1CPL7 (277V, 1-pole) or PS20AC2-CPL (2-pole 120/277V). Handle glows when switch is on. Provide clear handle switch, except use red handle for devices on emergency power circuits only.

(4) Key operated Single pole, double pole, 3-way, 4-way Extra Heavy Duty Specification Grade 20A 120/277V # PS20AC1-L, PS20AC2-L, PS20AC3-L, PS20AC4-L respectively.

(5) Toggle switch type equipment disconnect switches shall be heavy duty industrial grade type of ampere rating, voltage and number of poles indicated. 30A, 40A or 60A, 2- or 3-pole 600 volt Hubbell HBL78xxD-series, or approved equal.

D. Manual Motor Starter Switches:
(1) Square D class 2510 type F, with overload protection, 1-Pole or 2-pole as required. With overload heaters selected per manufacturer’s recommendation for actual motor nameplate amperes. Use for all locations unless switch without overload protection is specifically indicated.

(2) When non-overload protected manual motor starter switches are indicated use Square D class 2510 type K switches of the number of poles and mounting style for the particular application.

E. V Duplex Receptacles:

(1) For all locations except individual receptacles on 20 ampere circuits use Extra Heavy Duty Specification Grade, wide body 20A, 125V #5362A Back and Side.

(2) For individual duplex receptacles on 15 ampere circuits use types same as above, except rated 20A, 125V #5262A.

(3) For isolated ground use Extra Heavy Duty Specification Grade, 20A, 125V #IG6362 Back and Side Wired. Use orange color isolated ground devices.

(4) All duplex receptacle devices shall have Auto-ground clip on one device mounting screw.

(5) 15A and 20A, 125V or 250V receptacle devices shall be tamper resistant type when installed in locations described in NFPA-70 National Electrical Code section 406.12.

F. Ground Fault Circuit Interrupter Receptacles:

(1) Spec Grade 20A, 125V #2097. Use for all weatherproof receptacles and at any location specifically indicated. Do not use feed-through type GFCI unless indicated.

(2) When device is an individual duplex GFCI receptacle on a 15 ampere circuit use Specification Grade 20A, 125V #1597.

(3) Use tamper resistant type versions of above in locations described in NFPA-70 National Electrical Code section 406.12.

G. Special Receptacles: Ampere rating, voltage, number of poles and NEMA type as indicated. All such devices shall be specification grade. 20A and smaller devices shall be same color as listed above for switches and duplex receptacle type devices. 30A and larger single receptacles shall be permitted to be brown or black color if devices are not available in color to match the lower rated devices.

H. Time Switches:

(1) One, Two and Four Pole Electronic time switches for exterior lighting and sign control: Intermatic type ET-2805-C, ET-2825C and ET-2845C, respectively. Time switches shall be electronic type with battery or capacitor maintained stand-by power and
astronomical programming. Switch contacts rated minimum of 30A, 277V. Clock motor power voltage shall match supply circuit rating.

(2) Four and Eight Pole Electronic relay type panels for exterior lighting and sign control: Acuity Controls LC& D 'Blue Box' control panel. Each pole shall be capable of being programmed to a separate schedule. Units shall have stand-by power for programming and shall have astronomical programming (or photocell input when so indicated).

(3) Indoor enclosures shall be NEMA 1 rated metal enclosures. Outdoor enclosures shall be NEMA 3R rated metal enclosures.

(4) Time switches of types other than above shall be as indicated.

I. Photo Controls: Tork #2101/2104 or equal Paragon or Intermatic. Verify voltage with circuit to which unit is wired. Provide weatherproof junction box for mounting.

J. Furnish all devices of similar type as products of a single manufacturer.

2.6 COVER PLATES

A. For flush outlets in interior, non-weatherproof locations use Pass & Seymour standard size satin finish stainless steel #302. All plates shall be of same type and style. Do not use oversize cover plates to cover up oversized wall openings.

B. For surface outlets in interior, non-weatherproof locations with exposed raceways and cast aluminum type boxes use stainless steel type flush device plates as above, sized to fit the cast box face.

C. For weatherproof toggle switches use Pass & Seymour type CA1-GL, or approved equal.

D. For weatherproof 15A or 20A, 125V duplex receptacles located in damp locations as defined in Article 406.8 (A) of NFPA-70 use Pass & Seymour type 4512 (for GFCI type duplex receptacle), or approved equal.

E. For weatherproof 15A or 20A, 125V duplex receptacles located in wet locations as defined in Article 406.8 (B) of NFPA-70 use Pass & Seymour type WIUC10-G, or approved equal.

2.7 POWER DISTRIBUTION AND CONTROL EQUIPMENT

A. General:

(1) For the following classes of equipment, the catalog numbers listed are for products as manufactured by Eaton Corporation.
Equal products as manufactured by ABB/GE Industrial Solutions, Schneider Electric and Siemens are approved. Power distribution and control equipment shall be products of the same manufacturer.

(2) Terminal lugs for circuits rated 15A and larger shall be rated for use with 75º C rated conductors. Terminal lugs on equipment shall be sized for the conductor sizes as indicated. If necessary, provide larger circuit breaker frame sizes in order to accommodate the required lugs.

(3) Circuit breakers added to existing panelboards shall be same manufacturer, type and ratings as the existing panelboard. Note that existing panelboards on site are Federal Pacific Electric, GE and Square D brand equipment (no new circuit breakers will be added to the Federal Pacific equipment).

(4) Distribution and control equipment not listed below shall be as described on Drawings.

B. Branch Circuit and Distribution Panelboards:

(1) Type: Eaton PRL1A as scheduled.

(2) Arrangement and Ratings: Circuit breakers and spaces shall be arranged and numbered exactly as shown on panel schedules. Where spaces are indicated, they shall be fully prepared to accept an overcurrent device of the maximum rating for the frame size used in the panelboard. Circuit breakers shall be quick-make, quick-break, trip free thermal magnetic type. Minimum interrupting capacity 10,000 AIC unless indicated higher. Two and three pole breakers shall be common trip, do not use single pole breakers with handle ties for this function. Use bolt-on branch circuit breakers. Provide Main Lugs only or Main Circuit Breaker style panelboards as indicated. Circuits shall be numbered adjacent to each breaker with an engraved micarta number strip running vertical between the breakers or other approved permanent circuit number tags -- labels which can be peeled off breaker or dead-front are not acceptable. Provide a "Caution--Series Rated System" nameplate on interior of panel dead front when series tested short circuit rating of the panelboard is used.

(3) Bus Bars: All phase, neutral and ground busses shall be 98% conductivity copper. Provide an equipment ground bus, bolted or welded to the panel cabinet in all panelboards. When so indicated, provide an insulated, isolated ground bus. When so indicated, provide double capacity neutral bus (200% neutral).

(4) Cabinets and Fronts: Cabinets shall be made from unpainted galvanized code gauge steel. Cabinets shall be of sufficient size to provide a minimum gutter space on all sides not less than as required by Underwriter's Laboratories Standard (UL) 67 and in
no case less than 4". Minimum size of cabinets is 20" wide x 5-3/4" deep. End walls shall be blank. Fronts shall be fabricated from code gauge sheet steel. All exterior and interior steel surfaces of the front shall be properly cleaned and finished with gray ANSI-61 paint over a rust inhibiting phosphatized coating. Fronts for flush panels shall overlap the cabinet by at least 3/4" all around. Surface fronts shall have the same height and width as the cabinet. Provide a door over the overcurrent devices on all panelboards except for fusible switch panelboards. Doors shall have concealed hinges. Doors shall have a lock (all locks keyed alike). Panelboard fronts shall be hinged trim type with piano hinge down one side of the trim. (Door over dead front circuit breaker compartment; entire front opens by removing screws.)

Directories: Provide a metal directory frame welded to inside of panel front door with 1/16" thick plastic cover. Provide typewritten list of all circuits. Circuits shall be described using the final room name or number and any other pertinent data to accurately, succinctly and uniquely describe the destination of all circuits. Minimum size 5" x 8" for panels up to 20 circuits, provide two directories for larger panels. For fusible switch and circuit breaker distribution panelboards having a front without a door, provide a laminated bakelite nameplate for each circuit.

Only at specific locations where indicated provide Eaton type BR Loadcenter type panelboards. These are used to fit flush into 4-inch stud wall construction.

C. Safety Switches and Disconnects:

(1) Non-fused single pole toggle switch for 115 volt, single phase motors 3/4 horsepower and smaller shall be Square "D" Class 2510 type K motor starting switch.

(2) Provide "Heavy-Duty" type safety switches for all locations except as indicated above.

(3) Enclosures shall be suitable for location where used, i.e., use NEMA 3R enclosures at locations exposed to weather.

(4) Disconnects for motors and A/C equipment shall be horsepower rated.

(5) Disconnects shall be capable of being padlocked in the open or closed position.

2.8 FUSES

A. Provide Limitron, Low-Peak, Fusetron and Hi-Cap types as manufactured by Bussmann Division of Eaton Corporation. Fuses shall be of the voltage class, ampere rating and type as noted on the drawings. Fuse clips shall match the fuse type and class.

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B. When class RK-1 fuses are specified provide a permanent nameplate or label on each switch enclosure which states: "CAUTION -- REPLACE FUSES ONLY WITH CURRENT LIMITING TYPE OF SAME RATING."

C. Littelfuse and Mersen are approved equal to Bussmann.

2.9 LIGHTING FIXTURES

A. Lighting fixture schedule: The manufacturer, type, style, size, color, general arrangement, mounting, etc., of all lighting fixtures shall be as indicated on the lighting fixture schedule and as described elsewhere in the drawings.

B. General: All lighting fixtures shall be furnished complete with all brackets, lenses, lamps, etc., for a complete and finished installation.

   (1) Electrical Section shall coordinate with ceiling system to determine exact fixture mounting configuration to make fixtures compatible with ceilings used on this project. The Contractor shall be responsible for making fixtures compatible and fixtures which do not fit ceiling system must be corrected at his expense.

C. LED components:

   (1) LED Drivers for same type fixtures shall be same manufacturer and type for all same type light fixtures in Contract so as to have same operating characteristics and lamp life and to facilitate maintenance.

   (2) Voltage for fixtures shall correspond to voltage of circuit wired on -- in general, fixtures are connected to 120V or 277V branch circuits. Multi-voltage drivers may be used when suitable for the purpose.

PART 3 EXECUTION

3.1 GENERAL

A. Work to be accomplished under this specification shall be performed by experienced, competent personnel. Contractor or sub-contractors performing the work shall be licensed by the State of Arizona Registrar of Contractors for each category of work performed.

B. Except where otherwise specifically permitted by these specifications or drawings, raceways and wiring of every system shall be installed concealed.
C. Except where otherwise specifically permitted by these specifications or drawings, all wiring of every system shall be installed in approved raceways. The "PRODUCTS" part of this specification describes the approved locations for each type of raceway system and the requirements set forth in that section shall be adhered to for all raceway systems including systems for power, lighting, telephone, clock, sound, fire alarm, television, data, and any other special system. The use of types NM, SE and UF cable type wiring methods are not approved. Types AC and MC cables may be used for 20A and smaller rated branch circuits installed above grade, indoors, in lieu of conductors installed in raceways.

D. Any installation of underground conduit stub-ups to switchboards, motor control centers, transformers and similar equipment will be rejected until such time that reviewed shop drawings are on site to compare rough-ins with conduit space in the equipment.

E. Chases and Openings:

   (1) Any chases and openings other than those described on drawings that are found necessary to accommodate electrical work shall be provided at proper time to prevent unnecessary cutting. Provide approved access panels or doors if necessary.

   (2) Fire stop all chases and openings as required by Firestopping section.

F. Penetrations through Roof:

   (1) Penetration through finished roof caused by work of this division shall be properly flashed or otherwise waterproofed as required by the roofer and Architect.

   (2) No penetration shall occur closer than 12" from any other penetration.

   (3) No electrical work shall run above roof except for vertical penetration for roof mounted HVAC equipment.

3.2 EXCAVATION

A. Do all excavating required to install the work. Except under concrete floors laid on the ground, the underground conduit shall be buried to a depth of not less than 24" below the finished grade.

B. The depth of conduits run under concrete floors and slabs on grade (concrete minimum 4" thickness) may be reduced to 8" below the slab. Do not allow conduits to be embedded in the concrete floor, except at floor boxes and where conduits turn out of floor.
C. Backfill, puddle and tamp all excavations and remove all surplus materials from the site. All backfill and compaction shall be in accordance with the Architect's instructions. Provide plastic marker tape 12" below grade over all underground conduit runs outside of building.

3.3 INSTALLATION OF RACEWAYS

A. Unless otherwise noted, all wiring of every description shall be run in conduit. Conduit, except as otherwise specifically noted, shall be run concealed. Exposed conduit shall be run parallel with supporting wall, beam or ceiling and with each other, with right angle turns consisting of cast metal fittings (LB condulets shall not be used for conduit larger than 1-1/4" in diameter) or symmetrical bends, and with supports spaced at not more than 5’ apart. All runs of conduit shall be installed in such manner as to avoid trapped condensation. No junctions or splices in wire shall be made in condulets.

B. Minimum size conduit is 1/2”. Where five or more No. 12 AWG wires are in one conduit minimum size shall be 3/4". Where No. 10 AWG or larger wire is used minimum size shall be 3/4". Larger sizes as noted. Minimum size underground conduit is 3/4”.

C. Conduit shall be installed as a complete system, continuous from outlet to outlet, cabinet, box for fitting and be so mechanically and electrically connected that adequate electrical continuity from one conduit to another is secured.

D. Conduit to be installed in concrete work shall be carefully laid and rigidly supported in the forms, as directed, and in such manner as to provide proper clearances and so that all boxes and outlets will be in exact locations after concrete has set and forms are removed. Conduit run in concrete walls or floors shall be embedded deep enough so that no portions of the conduit or fittings will show through the concrete and so there will be no cracking of the concrete finished surfaces. Obtain approval of the Structural Engineer prior to installing conduits in concrete work. Use only rigid steel conduit embedded in concrete.

E. Conduit shall not run through any structural member of the building, except as specifically directed by the Architect. This shall not prohibit conduit run through open web trusses or through factory made openings in structural members.

F. On exposed runs of conduit where junctions, bends or offsets are required, provide condulets whether such condulets are indicated on drawings or not. Bends will not be permitted around corners or beams, or equipment. Condulet covers shall be accessible. Condulet fittings shall not be used on conduit larger than 1-1/4" trade size. Use junction
boxes on larger conduit. Use two hole straps on all exposed runs of conduit.

G. Separate conduit shall be used for each home run indicated on drawings. Do not combine conduit runs. Run exactly as shown on the plan. Do not run branch circuits under floor unless so indicated (by dashed lines) on the plans.

H. Conduits shall be securely supported to the building structure. Support or fasten conduits within 18" of all outlet, junction or pull boxes. Support or fasten conduit runs at intervals not to exceed 5'-0" on center. Single runs of conduit may be supported with 12 gauge galvanized tie wire. For multiple runs, use conduit trapezes made of suitable Unistrut or Kindorf channel with threaded rod (not less than 1/4" outside diameter) and suitable conduit straps. For multiple exposed conduit runs, use Unistrut or Kindorf channel with suitable conduit straps. Channels embedded in concrete shall not be deeper than 7/8". Nails, perforated strap and plumber's tape are not acceptable means of support. Do not use strut clamps or pipe hangers exposed below 8'-0" AFF. Exposed conduits installed below 8'-0" AFF shall be supported with 2-hole pipe straps.

I. Anchors which fasten devices, raceways, etc. to brick or masonry shall be metal expansion type with screws or bolts. Plastic or shot-in anchors are not acceptable.

J. Anchors which fasten devices, raceways, etc. to hollow, dry, or plaster walls shall be a type which expands after it has penetrated the material such as toggle, molly, etc. Wood screws into 2x4 or larger wood framing is acceptable.

K. Conduit shall not run closer than 6" to any hot water pipe, steam pipe, heater flue or vent.

L. Projections through roofing shall be made watertight by proper flashing and/or pitch pockets satisfactory to Roofing Contractor, Architect and roof bonding company. Verify method prior to rough-in and comply as required. Contractor shall supply all required roof jacks.

M. Conduit connections to tops of enclosures located outdoors or other location subject to water shall be made with Myers hubs or weatherproof hubs that are supplied with the equipment. Gasketed locknuts as only weatherproof fitting are not approved for conduits entering the tops of enclosures.
N. The use of pliers for tightening of conduit connections or making up runs of conduit is prohibited. All conduit joints and connections shall be wrench tight.

O. Upon completing the installation of any run of conduit, test the runs and see that they are free from all obstructions and have a smooth interior. Plug each end with conduit pennies and bushings and leave plugged until ready to pull wire. Wood or fiber plugs or concrete nails are not acceptable.

P. The ends of conduit shall be cut square and carefully reamed out to full size with a tapered burring reamer and shouldered in the fitting.

Q. No running threads will be permitted, special union fittings shall be used in lieu thereof. The open ends of conduit shall be kept closed with approved conduit seals during the construction of the building. Rigid conduit couplings shall be of the threaded type.

R. Except as otherwise indicated on drawings, bends in conduits 1" and larger shall be made with standard conduit ells. Wire or cable bends in junction boxes or pull boxes shall be made on long radius of not less than five (5) times diameter of the cable. Nesting of conduits shall be made when more than one conduit is used in parallel without the use of standard ells.

S. Where ungrounded conductors of No. 4 or larger enter a raceway in a gutter, pull box, junction box, or auxiliary gutter, the conductors shall be protected by a substantial bushing or liner sleeve providing a smoothly rounded insulating surface, unless the conductors are separated from the raceway fitting by a substantial insulating material securely fastened in place.

T. A nylon pull string shall be installed in all raceways which do not have conductors pulled by this contractor.

U. Flexible "Greenfield" shall be used only where necessary, approved, or directed for connections to equipment which is removable (as for belt replacement and adjustment), or is mounted on isolation units for nontransmittal of vibration or sounds of operation. Regulation fittings shall be used for all connections to terminal, junction and switch boxes. Use liquid-tight flex where exposed to weather. Maximum length shall be 3'-0". Run conduit to within 3'-0" of outlet before using flex.

V. Stub-ups into flush-in-grade pull or splice boxes shall be turned up to at least 3" above the highest dirt level in the box. Use 45º PVC sweeps into box and provide bell ends on raceways 2" size and larger.
3.4 INSTALLATION OF OUTLETS, WIRING DEVICES AND JUNCTION BOXES

A. Lighting outlets, convenience outlets and wall switches shall be installed as shown on the drawings, with switch control as indicated. All outlets and switches shall be accurately located and shall be installed plumb with building walls. The final position of such outlets must be verified with the Architect. Wall switches shall typically be within 4” of the door frame on the lock side according to the Architectural plans.

B. Outlets in unplastered masonry walls shall be 4” square (or larger when required) boxes with deep plaster rings or box extensions already attached to the box when the outlet box is installed in the masonry. Help the Mason set each box (and every box) in place, so that the face of the ring or extension is vertical and approximately 1/16” in from the finished surface. The Mason and Electrician shall be mutually responsible for the proper execution of the work.

C. Light outlet boxes shall be sized to comply with Code, but not less than 4” square.

D. Ceiling outlet boxes shall be equipped with plaster rings and extension rings as required.

E. Convenience outlets, switch, telephone, television and intercom outlets, shall be 4” square (or larger when required) pressed steel boxes with plaster rings.

F. Flush outlet boxes shall be installed with the box edge flush to not more than 1/16” recessed into the wall. Provide box extensions as necessary for proper installation.

G. Outlet boxes in concrete shall be of a type which will allow the placing of conduit without displacing of reinforcement bars.

H. Boxes shall be set so that when covers are in place they will be flush with finished building surface, and so that fixtures will stand at right angles. Where exposed to weather, use conduit cast body type or cast aluminum type.

I. All boxes shall be securely supported to the building structure. In metal stud work, provide bracing between studs for all boxes. Attachment to a single vertical metal stud without additional bracing is not acceptable.

J. Safety switches and disconnects for HVAC and similar equipment shall be supported independently from unit. Provide Unistrut or Kindorf brackets from structure as required. Do not attach switches to equipment or duct work.
K. Approved bar hangers, fitted with fixture studs, shall be used to support outlet boxes in stud partitions and furred or drywall ceilings.

L. The Owner shall reserve the right, without additional cost, to relocate any outlet up to 6'-0" from the location shown on the drawings provided that such instruction is given to the contractor prior to rough-in.

M. Mounting Heights:

(1) Light Switches +3'-10" unless otherwise directed
(2) Control Switches for HVAC +4'-6" unless otherwise directed
(3) Receptacles +1'-6" unless otherwise directed
(4) Telephone, Data, etc. +1'-6" unless otherwise directed
(5) Wall bracket lights As directed
(6) Heights given are from box center to finish floor. Consult Architect for any heights not listed above.
(7) Existing outlets reused for the new work need not be relocated to comply with the heights indicated above except that operating controls shall not exceed +4'-6" height to centerline.

N. All receptacle devices shall be installed vertical unless otherwise directed. Install with grounding pole at top. When receptacle devices are horizontally mounted, grounding pole shall be at left side.

O. All control apparatus, outlet boxes, junction and pull boxes, and other similar equipment shall be installed and maintained in accessible positions and locations. Refer to the complete set of drawings covering the mechanical and architectural plans for locations of HVAC equipment (dampers, motors, etc.) and access panels. At areas adjacent to these openings, provide accessible locations for junction and pull boxes.

P. Provide a junction box accessible and close to all recessed can and similar type lighting fixtures. This box shall be furnished as part of the lighting fixture. Wiring from lamp socket to junction box shall be approved for temperature involved. This box shall be sized to allow a minimum of eight No. 12 AWG conductors in the box. When more than eight No. 12 AWG conductors are in box provide oversize boxes.

Q. Receptacle outlet supplying wall mounted electric drinking fountains shall be concealed within the drinking fountain so that unit cord and plug is not visible after installation.

R. Convenience receptacle outlets (weatherproof, GFCI type) shall be located on roof within 25' of HVAC equipment. If not shown on drawings, the receptacles shall be provided and shall be connected to
the nearest 120V receptacle circuit. Devices shall be weatherproof, GFCI type duplex receptacle.

S. Surface mounted boxes installed below 8'-0" A.F.F. shall be cast aluminum type or when larger than three gang shall be standard sheet metal type with screw on cover and no knockouts.

T. Every box shall have a cover, either blank or the appropriate system outlet cover. Telephone, data and similar outlets which are not activated with an outlet shall have a blank stainless steel cover installed.

U. Outlets for telephone, data, television, computer and similar systems shall have a raceway stubbed from the outlet box to accessible ceiling space unless specifically indicated otherwise. When no accessible ceilings exist the raceway shall run to the nearest telephone (or applicable other system) terminal board or terminating point on the same floor level as the outlet. Floor outlets may stub into ceiling space of floor below unless specifically indicated otherwise. Minimum size raceway is 3/4-inch. Two outlets back-to-back shall be permitted to be nipple together with 3/4-inch raceway and a single 1-inch raceway stubbed out as described above. Use larger raceways when specifically indicated. When a specific raceway layout is shown on drawings it shall take precedence over the general requirements stated in this paragraph. When no specific raceway layout is shown on drawings then the general requirements stated herein shall apply. Coordinate with Division 28.

V. Switch and receptacle devices shall be wired using the back wiring terminals on the device which are tightened by a screw. Do not thru-wire receptacles. Instead, provide wire nut splice in box to tap circuit to feed the receptacle device. All screw terminals on wiring devices shall be made tight.

W. Three-way and four-way switches shall be installed such that when all switches on the same switch leg are operated with the toggle handle down the load will be off.

X. 15A and 20A, 125V receptacle devices shall be GFCI type or GFCI protected when installed in locations required by NFPA-70, National Electrical Code Article 210.8. Do not use feed-thru type devices unless indicated.

Y. Flush-in-grade pull or splice boxes shall be set with top flush with surrounding grade or if in concrete flush with the concrete surface. Provide at least 1/8 cubic yard crushed rock in excavation below the box for size E3.5 boxes. Provide 1/4 cubic yard crushed rock below the box for sizes E5 and E7 boxes.
3.5 INSTALLATION OF CONDUCTORS

A. All circuits and feeder wires shall be continuous from switch to terminal or most distant outlet. No splices shall be made except in pull, junction or outlet boxes, or in switchboards or panels.

B. Thoroughly clean out all conduits and wireways and see that all parts are perfectly dry before pulling any wires. Do not install any permanent wiring until all drywall taping is done and dirt removed. Any run of conduit which does not allow conductors to be fished in readily will be condemned and the run must be replaced by other conduit satisfactory to the Architect.

C. Splices and taps for conductors No. 10 AWG and smaller shall be made with approved solderless mechanical connectors, size of the connector to be selected in accordance with the listing of the connector. All splices and taps which are not self-insulating shall be covered with thermoplastic insulating tape (Scotch No. 33) layered to a thickness equal to or greater than the conductor insulation.

D. At all outlet and switch boxes, leave not less than 6" free conductor outside of the box for connection of devices and fixtures.

E. Provide pull boxes wherever indicated or as necessary to facilitate the pulling in of wires or cables. Run shall not exceed 200' for straight pulls without any bends. Reduce pull box spacing to 150' if one 90 degree bend or equivalent in the run; 100' if two 90 degree bends or equivalent in the run; and 90' if more than two 90 degree bends or equivalent in the run. Pull boxes shall be sized in accordance with Article 314 of the National Electrical Code.

F. Vertical runs shall be supported in accordance with Section 300-19 of NFPA-70 National Electrical Code. Use wedge-in conduit cable supports or cleats in J-box as required.

G. Underground splices in pull boxes or direct buried shall be insulated with listed splicing and insulating materials for submersible, water proof splices.

H. Minimum size conductors for power and lighting circuits is #12AWG, copper. Provide larger conductors when indicated.

I. Do not provide multi-wire branch circuits. Each branch circuit shall be provided with an individual neutral conductor which shall not be shared with other circuits. Exception: When multi-wire branch circuits are indicated. When multi-wire branch circuits supply receptacle outlets, the
neutral conductor common to 2 or more circuits shall be one conductor size larger than the phase conductors.

3.6 TAGGING

A. All branch circuits shall be left tagged in panelboards, gutters, etc., for the purpose of distinguishing the various circuits. Phase, neutral, equipment grounding and isolated grounding conductors shall be tagged with circuit numbers. In addition, where more than one circuit occurs in junction boxes, provide tags indicating circuit numbers. All feeders and main lines shall be tagged in all junction boxes, gutters, switchboards, etc. Use Ideal or Brady wire marker numbers for circuit numbers, etc. Do not use metal numbering tags.

3.7 INSTALLATION OF PANELBOARDS, SWITCHBOARDS, ETC.

A. Panels and equipment enclosures shall be securely supported to wall to which they are mounted in accordance with the equipment manufacturer’s installation instructions.

B. In general, branch circuit panelboards shall be installed with top at 6’-3” above finished floor. For wall mounted panels over 5’-6” high consult Architect for mounting height.

C. When more than one branch circuit panelboard is installed in the same location or room, the panels shall be mounted with tops at all same height.

D. Provide at least one 1-1/4 inch conduit nipple between all adjacent panelboard back boxes that are flush mounted at a common location. This conduit shall be empty for future use.

E. Where branch circuit panelboards are installed flush with the walls, empty conduits shall be extended from the panel to an accessible space above or as indicated on the plans. Furnish a minimum of one 3/4” conduit for every three single pole circuit breakers or spaces or fraction thereof, but never less than three conduits. Provide one additional 1-1/4” conduit stub on all 200A and larger panelboards.

F. When conduits leave top of weatherproof switchboards or panelboards, conduit connections to the equipment shall be made with Myers hubs or weatherproof hub type fittings by the switchboard or panelboard manufacturer. Generally, conduits shall not leave the tops of switchboards and panelboards installed outside unless specifically indicated; or with special permission.
G. Panelboards and switchboards shall be installed with all operating handles not over 6'-7" above finished floor.

H. Conductors in panelboard interiors shall be neatly trained but shall not be tightly bundled or tied together.

3.8 MOUNTING AND INSTALLATION OF LIGHT FIXTURES

A. Lighting fixtures shall be adequately supported to building structure in accordance with applicable building codes.

B. Provide approved seismic clips to attach fixtures to the ceiling grid on all fixtures installed in grid ceilings. Such clips shall be constructed to be able to support the entire weight of the fixture in any direction.

C. When for any reason light fixtures have an asymmetrical lighting pattern or appearance, all similar fixtures shall be installed with the with the asymmetry or pattern aligned or oriented in the same direction to provide a uniform appearance, unless other specific instruction is given regarding the placement or orientation of the light fixtures.

D. In hard (non-accessible) ceilings, the fixture wiring and maintenance (such as LED driver replacement) shall be accessible through the light fixture trim opening. Do not use flex conduit whips with remote inaccessible junction boxes to supply such fixtures. Instead, the branch circuit wiring shall be run to the permanent outlet box mounted to the fixture, accessible through the fixture trim opening.

E. Light fixtures shall not be operated (other than testing) more than 3 months ahead of substantial completion (or preliminary use by the Owner).

3.9 OVERCURRENT PROTECTION

A. All equipment shall have proper overcurrent protection.

B. The fuse sizes indicated on the drawings for motors and equipment are based on equipment sizes as specified. Substitutions of equipment as well as change in manufacturer may make overcurrent devices of a different rating necessary.

C. The contractor shall verify the actual nameplate ampere rating of all equipment and shall select fuses and overload heaters based on the following criteria.

(1) For motors:
a. When fuses are the only overcurrent protective device for the motor they shall be rated not over 125% of the motor full load running current. If possible, select fuses rated between 105% and 115% of the motor full load running current.

b. When manual or magnetic starters are provided for motors, size overload heaters based on motor nameplate amperes according to the starter manufacturer's instructions. Fuses used in conjunction with motor starter shall be sized as indicated.

(2) For heating units and appliances: Fuses shall be rated at least 125% but not over 150% of the unit full load running current, but in no case shall exceed the "Maximum Fuse Size" listed on the unit nameplate.

(3) For packaged A/C units: The fuse size shall not exceed the "Maximum Fuse Size" listed on the unit nameplate.

D. When circuit breakers (in panelboards or individually mounted) are shown as the only overcurrent device for appliances or equipment, verify the circuit breaker rating with the actual nameplate "Maximum Overcurrent Protection" or "MOCP" rating on the equipment. Provide actual circuit breaker ratings to comply with the equipment nameplate rating.

3.10 GROUNDING

A. All electrical apparatus, either stationary or portable, shall be adequately grounded, either by direct connection from frame of the apparatus or an approved ground wire connected securely to conduit, or by an approved grounded flexible cord through an approved cap and receptacle.

B. All raceways and junction boxes shall be installed in a manner such that all joints are electrically conductive to function as an equipment grounding conductor.

C. Concentric knockouts are not considered an adequate grounding means. Provide grounding bushings on all conduits connected to concentric knockouts for all system voltages.

D. For branch circuits and feeders, provide a green insulated equipment grounding conductor sized in accordance with Table 250.122 of NFPA-70, National Electrical Code, or as indicated whichever is larger. Such conductor shall be installed in the raceway along with the circuit conductors whether or not shown on the drawings.
E. Neutrals throughout the system shall not be grounded except at service entrance equipment and at the first overcurrent devices served by the secondaries of dry type transformers.

3.11 EQUIPMENT CONNECTIONS

A. All outlets, devices, equipment, etc., shall be connected to circuits and made operational as required.

B. The Electrical Section shall connect electrically all heating, cooling, ventilating and plumbing equipment. For HVAC equipment as specified in the Mechanical Section, the Electrical Section shall run all conduits to electrically operated thermostats and controls (line voltage and 24 volt) and do all line voltage control wiring. 24 volt control wiring will be provided by the Mechanical Section. The Electrical Section shall provide magnetic starters unless otherwise indicated. A disconnecting means shall be provided at all equipment by the Electrical Section unless equipment is furnished with integral disconnecting means which meets the requirements of NFPA-70.

C. Control wiring and conduit for mechanical system engineered control systems (i.e. Energy Management and Control System) shall be the responsibility of the special control Contractor as described in the Mechanical Section. Standards of material and workmanship for such wiring and conduit shall conform to this Specification section.

D. The Electrical and Mechanical sub-contractors shall coordinate their work along with the Architect to attain proper installation.

3.11 TESTS AND COMMISSIONING

A. Contractor shall test the work in sections. All defects shall be made good immediately at Contractor's expense, including all repairs to walls, ceilings, floors, or other portions of building damaged in making repairs. Furnish all instruments necessary for testing and pay observers necessary. Owner's representative will check observations only.

B. Contractor shall perform megger test on all feeders. Minimum resistance shall be 500,000 ohms to ground using 500V megger. All branch circuits shall be free from grounds and shorts. Contractor shall perform, as directed, megger test on any branch circuit or feeder as required by Engineer. All megger tests shall be made with representative from Engineer's office present.

C. Test and verify A-B-C phase rotation on main service entrance and at all motors.
D. Electrical equipment with adjustments or settings shall be adjusted as recommended by the equipment manufacturer, engineer or Owner as required or directed, for proper operation.

E. Controls systems such as lighting controls and time switches shall be adjusted to Owner’s schedule, or as directed. The Contract shall include the initial adjustment or settings as well as two follow-up sessions to change or modify settings upon the request of the Owner which may occur any time during the warrantee period. At the time such settings are made, the Contractor shall instruct the Owner on the methods of making the adjustments.

3.13 PAINTING

A. Exposed electrical conduits, boxes, equipment, enclosures, etc. shall be finish painted to match adjacent building finishes, except in equipment rooms or unfinished space, work may be left unpainted.

B. Do not paint panelboard fronts unless specifically directed.

C. When directed by Architect, outdoor equipment such as pad mounted transformer shall be painted (do not paint over any power company lettering on the transformer).

D. New outdoor panelboards, safety switches and similar equipment shall be field painted when located to be in public view unless located in service yard or similar location. To minimize the effects of solar warming of the equipment do not paint electrical equipment dark color. Outdoor switchboards located in equipment yards with direct solar exposure shall be painted white or off-white color. Exact colors as selected by Architect.

END OF SECTION
END OF DIVISION
DIVISION 27 - COMMUNICATIONS

270500  BASIC COMMUNICATIONS SYSTEMS REQUIREMENTS

1.   GENERAL

   A.   SECTION INCLUDES

       (1) Basic Communications Systems Requirements specifically applicable to Division 27 sections, in addition to Division 1 - General Requirements.

   B.   RELATED WORK:

       (1) Related work described elsewhere Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

   C.   SCOPE OF WORK

       (1) This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the Communications Systems as shown on the drawings and specified herein.

       (2) Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make their portion of the Communications Systems a finished and working system.

       (3) Description of Systems include but are not limited to the following:

           a.   Complete Structured Cabling System including, but not limited to:

                   i.   Voice and data backbone cabling and terminations.
                   ii.  Voice and data horizontal cabling and terminations.
                   iii. Information outlets (IO’s) including faceplates, jacks and labeling.
                   iv.  Equipment racks, cabinets, cable management and equipment.
                   v.   Telecommunication Room equipment including patch panels, optical distribution cabinets, and termination blocks.
vi. Cabling pathways.

vii. Grounding and Bonding

viii. Testing


d. Complete Classroom Sound Reinforcement Systems

e. Low Voltage Communications Wiring (less than +120VAC) as specified and required for proper system control and communications.

f. All associated backboxes, conduit, miscellaneous cabling, and power supplies required for proper system installation & support systems.

g. Firestopping of penetrations as described in Division 7 Section 27 05 03.

D. QUALITY ASSURANCE

(1) Codes
   a. National Fire Protection Association (NFPA)
   b. NFPA 70, National Electrical Code® (NEC®)
   c. NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces,
   d. NFPA 72, National Fire Alarm Code®
   e. NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment
   f. NFPA 76, Recommended Practice for the Fire Protection of Telecommunications Facilities
   g. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems
   i. NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials
   j. NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
   k. NFPA 780, Standard for the Installation of Lightning Protection Systems
   l. NFPA 5000™, Building Construction and Safety Code

(2) Reference Standards
   a. Telecommunications Structured Cabling System Standards:
b. All work and equipment shall conform to the most current ratified version of the following published standards unless otherwise indicated that draft standards are to be followed:

i. ANSI/NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling

ii. ANSI/TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises

1.) C.1- Commercial Building Telecommunications Standard

2.) C.2-Balanced Twisted-Pair Telecommunications Cabling and Components Standard

3.) C.3 - Optical Fiber Cabling Components Standard

4.) C.4 - Broadband Coaxial Cabling and Components Standard

iii. ANSI/TIA-569-C - Telecommunications Pathways and Spaces

iv. ANSI/TIA-606-B- Administration Standard for Commercial Telecommunications Infrastructure

v. ANSI/TIA-607-B - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

vi. ANSI/TIA-758-B - Customer-Owned Outside Plant Telecommunications Standard


viii. ANSI/TIA-942-A - Telecommunications Infrastructure Standard for Data Centers

ix. ANSI/TIA-1152 - Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

x. ANSI/TIA-1179 Healthcare Facility Telecommunications Standard

xi. ANSI/TIA/EIA-598-C - Optical Fiber Cable Color Coding

xii. NFPA 70 (NEC) - National Electrical Code (Current Edition)
xiii. UL 444 - Standard for Safety for Communications Cable

(3) BICSI - Telecommunication Distribution Methods, Customer Owned Outside Plant

E. Refer to individual sections for additional Quality Assurance requirements.

F. Qualifications:

a. Only products of reputable manufacturers as determined by the Architect/Engineer will be acceptable.

b. The installing Contractor shall be certified by the manufacturer of the structured cabling system to offer Commscope/Uniprise 25 component warranty; Corning NPI 25 year warranty. Shop drawings will not be approved until proof of certification is submitted. Refer to the end of this specification section for certification documentation requirements.

c. Each Contractor and their subcontractors shall employ only workers who are skilled in their respective trades and fully trained. All workers involved in the termination of cabling shall be individually certified by the manufacturer.

d. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.

e. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical and copper structured cabling systems and have personnel adequately trained in the use of such tools and equipment.

f. The Contractor must have a RCDD (Registered Communications Distribution Designer) on-staff serving as a project manager. Project shop drawings and test reports shall be stamped by the RCDD.

G. COMPLIANCE WITH CODES, LAWS, ORDINANCES:

(1) This Contractor shall conform to all requirements of the City of Tucson, Laws, Ordinances and other regulations having jurisdiction over this installation.
(2) This Contractor shall also conform to all published standards of the Vail Unified School District as related to this installation.

(3) In the event there are no local codes having jurisdiction over this job, the current issue of the National Electrical Code shall be followed.

(4) If there is a discrepancy between the codes and regulations having jurisdiction over this installation, and these specifications, the codes and regulations shall determine the method or equipment used.

(5) If the Contractor notes, at the time of bidding, any parts of the drawings and specifications which are not in accordance with the applicable codes or regulations, he shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, he shall submit with the proposal, a separate price required to make the system shown on the drawings comply with the codes and regulations.

(6) All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.

H. EXAMINATION OF DRAWINGS:

(1) The drawings for the Communications Systems work are diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment etc., and the approximate sizes of equipment.

(2) Contractor shall determine the exact locations of equipment and the exact routing of cabling so as to best fit the layout of the job. Scaling of the drawings will not be sufficient or accurate for determining this layout. Where a specific route is required, such route will be indicated on the drawings.

(3) Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.

(4) If an item is either shown on the drawings, called for in the specifications or required for proper operation of the system, it shall be considered sufficient for including same in this contract.

(5) The determination of quantities of material and equipment required shall be made by the Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.
(6) Where words "provide", "install", or "furnish" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and terminate completely ready for operation, the items mentioned.

I. Electronic Media/Files:

(1) Construction drawings for this project have been prepared utilizing AutoCAD/AutoCAD Revit.

(2) If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.

(3) The electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.

(4) The drawings prepared for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.

(5) The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.

(6) The information is provided to expedite the project and assist the Contractor with no guarantee by Dplace as to the accuracy or correctness of the information provided. Dplace accepts no responsibility or liability for the Contractor’s use of these documents.

J. FIELD MEASUREMENTS:

(1) Before ordering any materials, this Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.

(2) Field conditions that will result in telecommunications drops that exceed the length limitations identified in the contract documents shall be brought to the attention of the Architect/Engineer prior to installation. The cost of reworking cabling that is too long, that was not brought to the written attention of the Architect/Engineer will be borne entirely by the Contractor.
This Contractor shall provide the Architect/Engineer with written documentation of any cabling drops that will not be able to use the cable tray (where cable tray is available) due to the resulting cabling lengths. This documentation shall be submitted prior to installation and installation shall not commence until approved by the Architect/Engineer.

2. PRODUCTS
   A. REFER TO INDIVIDUAL SECTIONS
   B. General Product Requirements” Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.
   C. Materials and equipment shall be the standard products of the manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer’s latest standard design that has been in satisfactory use for at least 2 years prior to bid opening, and as approved by submittal.

3. EXECUTION
   A. FIELD QUALITY CONTROL
      (1) General:
         a. Refer to specific Division 27 sections for further requirements.
         b. The Contractor shall conduct all tests required and applicable to the work both during and after construction of the work.
         c. The necessary instruments and materials required to conduct or make the tests shall be supplied by the Contractor who shall also supply competent personnel for making the tests who has been schooled in the proper testing techniques.
         d. In the event the results obtained in the tests are not satisfactory, This Contractor shall make such adjustments, replacements and changes as are necessary and shall then repeat the test or tests which disclose faulty or defective work or equipment, and shall make such additional tests as the Architect/Engineer or code enforcing agency deems necessary.
         e. All telecommunications tests that fail, including those due to excessive cabling lengths, shall be remedied by the Contractor without cost to the project.
(2) Protection of Cable From Foreign Materials:

a. It is the Contractor’s responsibility to provide adequate physical protection to prevent foreign material application or contact with any cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer’s performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.

b. Application of foreign materials of any kind on any cable, cable jacket or cable termination component will not be accepted. It shall be the Contractor’s responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the cable containing overspray. Should the manufacturer and warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced. In the case of plenum cabling, in addition to the statement from the manufacturer, the Contractor shall also present to the Owner a letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.

c. Comply with manufacturer’s instruction for installation of products, Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

B. INSTRUCTING THE OWNER’S REPRESENTATIVE

(1) Adequately instruct the Owner’s designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.

(2) Provide verbal and written instructions to the Owner’s representative or representatives by FACTORY PERSONNEL in
the care, maintenance, and operation of the equipment and systems.

(3) The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.

(4) The Architect/Engineer shall be notified of the time and place for the verbal instructions to be given to the Owner's representative so that their representative can be present if desirable.

(5) Refer to the individual specification sections for minimum hours of instruction time for each system.

(6) Operating Instructions:

   a. The Contractor is responsible for all instructions to the Owner and/or Owner’s operating staff on the Communications Systems.

   b. If the Contractor does not have Engineers and/or Technicians on staff who can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, they shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

C. SYSTEM COMMISSIONING

(1) The Communications Systems included in the construction documents are to be complete and operating systems. The Architect/Engineer will make periodic job site observations during the construction period. The system start-up, testing, configuration, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of electrical equipment controls, equipment settings, software configuration, troubleshooting and verification of software, and final adjustments that may be required.

(2) All operating conditions and control sequences shall be simulated and tested during the start-up period.

(3) The Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to insure that the system performs as designed. If the Architect/Engineer is requested to visit the job site for the purpose of trouble shooting, assisting in
the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Owner on a time and material basis for services rendered at the Architect/Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

D. ADJUST AND CLEAN

(1) Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.

(2) Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment.

(3) Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

END OF SECTION
270526 GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

1. GENERAL
A. SECTION INCLUDES
   (1) Bonding Conductors
   (2) Bonding Connectors
   (3) Grounding Busbar (TMGB and TGB)
   (4) Rack-mount Telecommunications Grounding Busbar

B. RELATED WORK
   (1) Section 26 05 13 – Wire and Cable
   (2) Section 26 05 26 – Grounding and Bonding
   (3) Section 26 05 33 – Conduit
   (4) Section 26 05 36 – Cable Trays
   (5) Section 26 41 00 – Lightning Protection Systems
   (6) Section 27 05 00 – Basic Communications Systems Requirements
   (7) Section 27 05 32 – Firestopping
   (8) Section 27 05 53 – Identification and Administration
   (9) Section 27 11 16 – Communications Cabinets, Racks, Frames and Enclosures

C. QUALITY ASSURANCE
   (1) Refer to Section 27 05 00 for relevant standards
   (2) Material and work specified herein shall comply with the applicable requirements of the current revision of the following:
      a. ANSI/TIA-568 Commercial Building Telecommunications Cabling Standard
      b. ANSI/TIA-569 Telecommunications Pathways and Spaces
      c. ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
      d. BICSI – Telecommunications Distribution Methods Manual
      e. J-STD-607-A Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
      f. NFPA 70 – National Electric Code
   (3) Communications bonding system component, device, equipment, and material manufacturer(s) shall have a minimum of five (5) years documented experience in the manufacture of communications bonding products.
(4) The entire installation shall comply with all applicable electrical codes, safety codes, and standards. All applicable components, devices, equipment, and material shall be listed by Underwriters’ Laboratories, Inc.

D. REFERENCES

(1) ANSI/IEEE 1100 – Recommended Practice for Power and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems

(2) ANSI/TIA/EIA 568-C – Commercial Building Telecommunications Cabling Standard

(3) ANSI/TIA/EIA 569-A – Commercial Building Standard for Telecommunications Pathways and Spaces

(4) ANSI/TIA/EIA 606 – Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

(5) ANSI/TIA/EIA 758 – Customer Owned Outside Plant

(6) ANSI-J-STD-607-A—Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications


(8) IEEE 837 – IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding

(9) NFPA 70 – National Electrical Code

(10) NFPA 780 – Standard for the Installation of Lightning Protection Systems

(11) UL 96 – Lightning Protection Components

(12) UL 96A – Installation Requirements for Lightning Protection Systems

(13) UL 467 – Grounding and Bonding Equipment

E. SUBMITTALS

(1) Submit product data and shop drawings under provisions of Section 27 05 00 and Division 1.

(2) Provide manufacturer’s technical product specification sheet for
each individual component type. Submitted data shall show the following:

(3) Compliance with each requirement of these documents. The submittal shall acknowledge each requirement of this section, item-by-item, including construction, materials, ratings, and all other parameters identified in Part 2 - Products.

(4) Manufacturer’s installation instructions indicating application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

F. DELIVERY, STORAGE, AND HANDLING

(1) Deliver products to the site under the provisions of Section 27 05 00.

(2) Store and protect products under the provisions of Section 27 05 00.

(3) Contractor shall exercise care to prevent corrosion of any products prior to installation. Corroded products shall not be acceptable for use on this project.

G. SYSTEM DESCRIPTION

(1) This section describes the requirements for the furnishing, installation, adjusting, and testing of a complete turnkey communications bonding system, including connection to the electrical ground grid.

(2) Performance Statement: This specification section and the accompanying drawings are performance based, describing the minimum material quality, required features, operational requirements, and performance of the system. These documents do not convey every wire that must be installed, every equipment connection that must be made, or every feature and function that must be configured. Based on the equipment constraints described and the performance required of the system as presented in these documents, the Contractor is solely responsible for determining all components, devices, equipment, wiring, connections, and terminations required for a complete and operational system that provides the required performance.

(3) This document describes the major components of the system. All additional hardware, subassemblies, supporting equipment,
and other miscellaneous equipment required for complete, proper system installation and operation shall be provided by the Contractor.

(4) Basic System Requirements:

a. A complete communications bonding infrastructure is required for this project. Refer to the drawings and the requirements of ANSI-J-STD-607-A and NFPA 70 for complete information.

b. The bonding system shall include, but not be limited to, the following major components:

i. Bonding Conductor for Telecommunications (BCT)

ii. Telecommunications Main Grounding Busbar (TMGB)

iii. Telecommunications Bonding Backbone (TBB)

iv. Telecommunications Grounding Busbar(s) (TGB)

v. Rack mount Telecommunications Grounding Busbar(s)

vi. Bonding Conductor(s) (BC)

vii. Bonding Connectors

viii. Bonding system labeling and administration as defined in Section 270553

2. PRODUCTS

A. MANUFACTURERS

(1) Panduit: www.panduit.com

(2) Chatsworths Products Inc.: www.chatsworth.com

B. GROUND BARS

(1) Telecommunications Main Grounding Busbar (TMGB): TMGB shall be Panduit GB2B0612TPI-1 busbar kit.

(2) Telecommunications Grounding Busbar: (TGB) shall be Panduit GB2B0304TPI-1 busbar kit.

(3) Rack Grounding Strip: (RGB) shall be Panduit RGS134-1 with paint piercing grounding washers installed.

C. GROUND WIRE: Unless otherwise noted, all conductors green insulated stranded copper

(1) Telecommunications Bonding Backbone:(TBB) 2/0

(2) Common Bonding Network:(CBN) #6 AWG
(3) Equipment Jumper Kits: #6 AWG 24" length with 90 degree bent lug to straight lug

D. CONNECTORS AND ACCESSORIES

(1) Grounding Clamp: U-bolt bronze for attachment to rods, pipes (non-water) and tubes

(2) Ground Lugs:
   a. TMGB: Code conductor, two-hole, long barrel irreversible compression with window lug
   b. TGB: Code conductor, one-hole, long barrel irreversible compression with window lug

(3) Paint Piercing Grounding Washers: 3/8" stud size .875 O.D. with antioxidant

(4) HTAP: Single or multitap to meet conductor size with clear cover

(5) Electro Discharge (ESD) Port: Panduit RGESD-1 with wrist strap

(6) Exothermic Connections:

(7) Substitutions: See Section 01 6000 - Product Requirements.

3. EXECUTION

A. INSTALLATION

(1) General Bonding Requirements:

   a. The communications bonding system shall be a complete system. Contractor shall furnish and install all necessary miscellaneous components, devices, equipment, material, and hardware, including, but not limited to, lock washers, paint-piercing washers, hex nuts, compression lugs, insulators, mounting screws, lugs, etc., to provide a complete system.

   b. A licensed electrician shall perform all bonding to electrical systems.

   c. Bonding conductors shall be green or marked with a distinctive green color.

   d. Interior water piping is not acceptable for use as a communications bonding system bonding conductor.

   e. Metallic cable shields are not acceptable for use as communications bonding system bonding conductors

(2) Comply with the manufacturer’s instructions and recommendations
for installation of all products.

(3) Provide or coordinate installation of TBB from the main electrical service entrance ground bus.
   a. Do Not route TBB on Cable Ladderway
   b. TBB must be insulated if exposed more than 24" within the CER.

(4) Ensure TMGB is connectorized within 24" of TBB entrance has vertical access to Cable Ladderway and is no more than 18" above finished floor.

(5) Provide bonding to meet requirements described in Quality Assurance.

(6) Provide (1) RGB at of each rack.

(7) Provide (1) TGB at each Voice Board.

(8) Provide & install ground buses as shown on plans.

(9) Provide & install CBN from TMGB to each RGB & TGB in home run fashion. Do not daisy chain grounds.

(10) Provide & install CBN from TMGB to all ladderway. Provide CBN grounding across all joints in ladderway.

(11) Provide (2) spare Equipment Jumper Kits for each rack installed.

(12) Provide ESD port for each rack installed.

B. FIELD QUALITY CONTROL

(1) Owner will provide field inspection in accordance with Section 01 40 00.

C. TESTING

(1) Test installed system under provisions of Section 27 17 10.

(2) Measure and document resistance to ground at TMGB, each TGB, each RTGB, and each electrical distribution panel bonded to the TMGB or a TGB.

(3) Measurements shall be made not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage, and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the fall-of- potential method according to IEEE 81.

(4) Measured resistance to ground at TMGB, each TGB, and each RTGB must not exceed 1 ohm. Under no circumstances shall any point in the communications bonding system have a lower resistance to ground than that of nearby electrical distribution.
system components that it is bonded to.

(5) Measure and document voltage between screen of installed and terminated ScTP, FTP, and/or SSTP horizontal cables and electrical ground of electrical outlet(s) serving the information outlet location area.

a. The voltage between the screen and the ground wire shall not exceed 1.0 V rms, and 1.0 V dc for any installed and terminated ScTP, FTP, and/or SSTP horizontal cables.

(6) Include measurement documentation in test data submitted at completion of project.

END OF SECTION
270529 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

1. GENERAL
   A. SECTION INCLUDES
      (1) Hangers equipment supports.
      (2) Anchors and fasteners.
      (3) Backboards
   B. REFERENCES
      (1) Section 27 05 00 - Basic Communications Requirements
   C. SUBMITTALS
      (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   D. QUALITY ASSURANCE
      (1) Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.
      (2) Non-continuous cable supports and cable support assemblies shall be listed by Underwriters Laboratories for both Canadian and US standards (cULus).
      (3) Non-continuous cable supports shall have the manufacturers name and part number stamped on the part for identification.
      (4) Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience in the industry, and certified ISO 9000.
   E. Coordination
      (1) Coordinate installation of hangers supports and cables with other trades.

2. PRODUCTS
   A. MANUFACTURERS
      (2) Substitutions: See Section 01 60 00 - Product Requirements.
   B. MATERIALS
      (1) Non-continuous Cable Support Systems
a. Non-continuous cable supports
b. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed
c. Non-continuous cable supports shall have flared edges to prevent damage while installing cables
d. Non-continuous cable supports sized 1-5/16” and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces
e. Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments
f. Stainless Steel non-continuous cable supports are intended for indoor and outdoor use in non-corrosive environments or where only mildly corrosive conditions apply

(2) Multi-tiered non-continuous cable support assemblies
a. Multi-tiered non-continuous cable support assemblies shall be used where separate cabling compartments are required. Assemblies may be factory assembled or assembled from pre-packaged kits. Assemblies shall consist of a steel angled hanger bracket holding up to six non-continuous cable supports, rated for indoor use in non-corrosive environments; UL Listed.
b. If required, the multi-tier support bracket may be assembled to manufacturer recommended specialty fasteners including beam clamps, flange clips, C and Z purlin clips.

(3) Non-continuous cable support assemblies from tee bar
a. Tee bar support bracket with one non-continuous cable support, factory or job site assembled; rated for indoor use in non-corrosive environments; UL Listed.

(4) Non-continuous cable support assemblies from drop wire/ceiling
a. Fastener to wire/rod with one non-continuous cable support, factory or job site assembled; rated for indoor use in non-corrosive environments; cULus Listed.

(5) Installation accessories for non-continuous cable supports
a. Cable Pulley
i. Non-continuous cable supports may be used as an installation tool when a removable pulley assembly is included. The pulley shall be made of plastic and be without sharp edges. The pin and bail assembly must be able to be secured to the J-Hook during cable installation. The pulley must remain secured while cables are being pulled.

ii. The pin and roller assembly must be removed after cables are installed.

b. Cable Protector

i. The protective steel tube shall fit over threaded rod and be at least 4" in length.

ii. The tube shall prevent damage to cables placed in or pulled through CAT-CMTM U-hooks. The tube shall not inhibit the pulling of cables.

(6) Backboards

a. 3/4 " AC fire treated plywood

3. EXECUTION

A. INSTALLATION

(1) Install hangers and supports as required to adequately and securely support cable system components, in a neat and workmanlike manner, as specified in NECA 1 and minimally 4’ O.C.

a. Installation and configuration shall conform to the requirements of the current revision levels of TIA Standards 568 and 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer’s installation instructions.

b. Do not exceed load ratings specified by manufacturer.

c. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.

d. Follow manufacturer’s recommendations for allowable fill capacity for each size non-continuous cable support.

e. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

f. Do not drill or cut structural members.

END OF SECTION
270532 FIRESTOPPING FOR TELECOMMUNICATIONS SYSTEMS

1. GENERAL

A. SECTION INCLUDES
   (1) Firestopping of Through Penetrations in Fire Rated Assemblies.
   (2) Smoke Seals.
   (3) Construction enclosing compartmentalized areas.

B. SCOPE
   (1) This SECTION describes the requirements for furnishing and installing firestopping for fire-rated construction. This includes all openings in fire-rated floors, walls and other rated elements of construction, both blank (empty) and those accommodating items such as cables, conduits, pipes, ducts, etc.
   (2) Fireblocking for Concrete Floor or Wall Sleeved Cables.
   (3) Fireblocking for Gypsum Wall Sleeved Cables.
   (4) Fireblocking for Concrete Block Wall Sleeved Cables.

C. RELATED SECTIONS
   (1) Division 3 – Section 03 30 00 – Cast-In-Place Concrete
   (2) Division 4 – Section 04 22 00 – Concrete Unit Masonry
   (3) Division 9 – Section 09 20 00 – Plaster and Gypsum Board
   (4) Division 7 – Section 07 84 13 – Penetration Firestopping
   (5) Division 26 – Section 26 00 00 – Electrical
   (6) Division 27 – Section 27 00 00 – Communications

D. REFERENCES
   (1) ASTM E 84, “Surface Burning Characteristics of Building Materials”.
   (2) ASTM E 119, “Fire Tests of Building Construction and Materials”.
   (3) ASTM E 814, “Fire Tests of Through Penetration Firestops”.
   (5) ANSI/UL723, “Surface Burning Characteristics of Building Materials”.
   (6) ANSI/UL1479, “Fire Tests of Through Penetration Firestops”.
   (7) Underwriters Laboratories Inc. (UL) – Fire Resistance Directory
E. PERFORMANCE REQUIREMENTS

(1) Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.

(2) Where non-mechanical products are utilized, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction.

(3) Where it is not practical to use a mechanical device, openings within floors and walls designed to accommodate telecommunications and data cabling shall be provided with re-enterable products that do not cure or dry.

(4) Openings for cable trays shall be sealed using re-enterable firestopping pillows.

F. SUBMITTALS

(1) Submit under provisions of Section 01 30 00.

(2) Product Data: Provide manufacturer’s standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.

(3) Shop Drawings: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.

(4) Certificates: Product certificates signed by firestop system manufacturer certifying material compliance with applicable code and specified performance characteristics.

(5) Installation Instructions: Submit manufacturer’s printed installation instructions.

G. QUALITY ASSURANCE
(1) Products/Systems: Provide firestopping systems that comply with the following requirements:

a. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.

b. Firestopping products bear the classification marking of qualified testing and inspection agency.

c. Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

H. COORDINATION

(1) Coordinate layout and installation of Firestopping System with other trades.

(2) Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Architect.

(3) Storage and Handling: Avoid breakage, denting and scoring finishes. Damaged products will not be installed. Store devices and accessories in original cartons and in clean dry space; protect from weather and construction traffic. Wet materials will be unpacked and dried before storage.

I. PROJECT CONDITIONS

(1) Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.

(2) Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

(3) Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.

(4) Do not use materials that contain flammable solvents.
(5) Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

(6) Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

(7) Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

2. PRODUCTS

A. MANUFACTURERS

(1) Acceptable Manufacturer: Specified Technologies Inc., 200 Evans Way, Somerville, NJ 08876. Tel: (800) 992-1180, Fax: (908) 526-9623, Email: specseal@stifirestop.com, Website: www.stifirestop.com.

(2) Substitutions: Pre-Approval.

(3) Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

B. MATERIALS

(1) General: Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

(2) Firestop Sealants: STI SpecSeal® Brand single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:

a. Specified Technologies Inc. (STI) SpecSeal® Series SSS Sealant
b. Specified Technologies Inc. (STI) SpecSeal® Series LCI Sealant

(3) Firestop Putty: STI SpecSeal® Brand intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
3. EXECUTION

A. EXAMINATION

(1) Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer's installation instructions and technical information.

(2) Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.

(3) Provide masking and temporary covering to protect adjacent surfaces.

(4) Do not proceed until unsatisfactory conditions have been corrected.

B. INSTALLATION

(1) General: Install through-penetration firestop systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.

(2) Manufacturer’s Instructions: Comply with manufacturer’s instructions for installation of firestopping products.

C. FIELD QUALITY CONTROL
(1) Inspections: Owner shall engage qualified independent inspection agency to inspect through-penetration firestop systems.

(2) Keep areas of work accessible until inspection by authorities having jurisdiction.

(3) Where deficiencies are found, repair firestopping products so they comply with requirements.

D. ADJUSTING AND CLEANING

(1) Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

(2) Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

E. SCHEDULES:

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<th>Gypsum Board Wall</th>
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<td>C-AJ-0100, C-AJ-0101</td>
<td>C-AJ-0100, C-AJ-101</td>
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</tr>
</tbody>
</table>

END OF SECTION
1. GENERAL
   A. SECTION INCLUDES
      (1) Wall and ceiling outlet boxes.
      (2) Floor boxes.
      (3) Pull and junction boxes.
   B. RELATED SECTIONS
      (1) Section 27 05 00 - Basic Communications Requirements
      (2) Section 27 05 32 - Firestopping.
   C. SUBMITTALS
      (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
      (2) Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.
   D. QUALITY ASSURANCE
      (1) Conform to requirements of NFPA 70.
      (2) Products: Provide products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.
      (3) All building penetrations shall be reviewed and approved by the owner.

2. PRODUCTS
   A. MANUFACTURERS
      (1) Hubble; www.hubble.com
      (2) Wiremold; www.wiremold.com
      (3) Carlon; www.carlon.com
      (4) Substitutions: See Section 01 6000 - Product Requirements.
   B. CONDUIT REQUIREMENTS
      (1) Conduit Size: Comply with NFPA 70.
      (2) Minimum Size: 1 inch unless otherwise specified.
      (3) Conduit Sweeps.
a. All conduit shall use sweeps as follows
b. Non-thread couplings shall not be used on metallic conduits.
c. Metallic sweeps shall have a factory applied 40 mil PVC coating or be doubled (half overlap) wrapped with a 10 mil PVC plastic tape specifically manufactured for corrosion protection of metallic conduits installed below grade.
d. Sweeps shall have a minimum radius of 12 times the nominal diameter of the conduit.

4) Underground Installations:
5) More than Five Feet from Foundation Wall: Use thickwall non-metallic conduit.
6) Within Five Feet from Foundation Wall: Use rigid steel conduit.

C. Outdoor Locations Above Grade:
1) Use rigid steel conduit or electrical metallic tubing.

D. Dry Locations:
1) Concealed: Use electrical metallic tubing.
2) Exposed: Use electrical metallic tubing.

E. Building Penetrations:
1) Provide core only.

F. METAL CONDUIT
1) RIGID STEEL CONDUIT:
   a. All conduits 2" and greater galvanized rigid steel.
   b. All Conduit Bends
   c. Description: ANSI C80.1, UL6 Hot-dipped, galvanized steel with zinc coating or corrosion resistant lacquer inside.

2) Intermediate Metal Conduit (IMC): Rigid steel.
3) Fittings and Conduit Bodies: NEMA FB 1; threaded, water and concrete-tight.

4) FLEXIBLE METAL CONDUIT
   a. Description: Interlocked steel construction.
   b. Fittings: NEMA FB 1.

5) LIQUIDTIGHT FLEXIBLE METAL CONDUIT
   a. Description: Interlocked steel construction with PVC jacket.
   b. Fittings: NEMA FB 1.

6) ELECTRICAL METALLIC TUBING (EMT)
   a. Suitable for all sizes up to and including 1-1/2"
   b. Description: ANSI C80.3, UL797; galvanized tubing, coated on the inside with a smooth, hard finish of lacquer, varnish or enamel.
c. Fittings and Conduit Bodies: NEMA FB 1; Throated steel compression gland type.

(7) NONMETALLIC CONDUIT
a. Unless otherwise specified, all conduit to be installed underground or installed in concrete structures shall be 4-inch diameter, rigid Polyvinyl Chloride (PVC) Non-Metallic Conduit.
b. Description: UL 651, NEMA TC 2; Schedule 40 PVC, heavy wall, sunlight resistant, manufactured from high impact material and shall be rated for use at 90 degrees centigrade.
c. Fittings and Conduit Bodies: UL 514, NEMA TC 3, Bell ends.
d. Solvent Cement: ASTM D 2564 a medium or heavy-bodied cement capable of making watertight joints.
e. Primer: As recommended by cement manufacturer for the conduit.

(8) INTEGRAL MULTI-CELL DUCT
a. Description: Schedule 40 PVC modular and.
b. Slip fit lengths.
c. Pre-lubricated innerducts with internal spacers and which expand and contract at the same rate as the outerduct.
d. Anti-reversing gaskets.
e. Integral innerduct o-ring.
f. Inward tapered holes.
g. Alignment indicator.
h. Marked 'INSTALL PRINT SIDE UP' with marked innerducts & holes for installation coordination.
i. Flexible bends cut through resistant.
j. Manufacturers:
l. Fittings: Match to manufacturers system.

(9) FLEXIBLE NON-METALLIC CONDUIT (INNERDUCT)
a. Requires perapproval for use in direct buried situations.
b. Description: Polyvinyl Chloride (PVC), or Polyethylene (PE) plastic.
c. Use Plenum innerduct in the appropriate environment.
d. Fittings: Connection between the flexible conduit and conduits of other materials shall be made with a watertight transition coupling manufactured for the specific type of material.
e. Smooth walled exterior and a ribbed interior with 1250 pound test muletape installed. No corrugated innerduct will be accepted.
f. Substitutions: See Section 01 60 00 - Product Requirements.
(10) OUTLET BOXES
   a. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel
      i.) New work: minimum 4"x 4" deep box with single mud
          ring
      ii.) Surface box: weather proof deep Bell box.
   b. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide
      gasketed cover by box manufacturer. Provide threaded
      hubs.

(11) FLOOR BOXES
   a. Floor Boxes: NEMA OS 1, fully adjustable, 1-1/2 inches
      deep.
   b. Material: Cast metal.
   c. Shape: Rectangular.
   d. Service Fittings: As specified in Section 26 2726.
   e. Approved Manufacturer
      i.) Hubble HBLCFB401
      ii.) Wiremold RFB4

(12) PULL AND JUNCTION BOXES
   a. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
   b. Hinged Enclosures: As specified in Section 26 2716.

3. EXECUTION
   A. EXAMINATION
      (1) Verify that field measurements are as shown on drawings.
      (2) Verify routing and termination locations of conduit prior to rough-in.
      (3) Conduit routing is shown on drawings in approximate locations
          unless dimensioned. Route as required to complete wiring
          system.
      (4) Verify locations of floor boxes and outlets in offices and work areas
          prior to rough-in.
   B. HANDLING & STORAGE
      (1) All conduit shall be transported in modules or bundled in a straight
          and level position. The straps securing the conduit to any
          transport vehicle shall be a minimum of 4 inches in width and shall
          not deform or damage the conduit in any manner. Conduits shall
          be unloaded in accordance with the manufacturer's
          recommendations and shall not be dropped to the ground.
      (2) All conduit shall be transported in modules or bundled in a straight
          and level position. The straps securing the conduit to any
transport vehicle shall be a minimum of 4 inches in width and shall not deform or damage the conduit in any manner. Conduits shall be unloaded in accordance with the manufacturer’s recommendations and shall not be dropped to the ground.

C. INSTALLATION

(1) All underground conduits shall have a minimum 36” cover.

(2) Install a minimum of four 1 inch smooth wall exterior ribbed interior innerducts in all 4 inch conduits.

(3) Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.

(4) All conduits subject to mechanical injury or exposed in wet locations shall be Rigid Galvanized Steel.

(5) Flexible conduit shall not be utilized for making bends in conduit system.

(6) Field bent conduit shall not have flat spots or crimps.

(7) Connection between flexible conduits and conduits of other materials shall be made with a watertight transition coupling manufactured for the specific type of material.

(8) Connection to a RGS bend, shall use a threaded PVC female adapter.

(9) Arrange supports to prevent misalignment during wiring installation.

(10) Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

(11) Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.

(12) Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

(13) Do not attach conduit to ceiling support wires.

(14) Route exposed conduit parallel and perpendicular to walls.

(15) Route conduit installed above accessible ceilings parallel and perpendicular to walls.

(16) Cut conduit square using saw or pipecutter; de-burr cut ends.

(17) Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
(18) Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.

(19) Install no more than equivalent of two 90 degree sweeps between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.

(20) All 90-degree turns in raceway must be provided with the appropriate junction to ensure non-violation of bend radius

(21) Any conduit from a workstation that does not go home-run to the telecommunications room but rather is specified as a stub out above a push-up tile ceiling shall include a gentle sweep toward the proposed telecommunications closet, a connector, and bushing.

(22) Install non-metallic flexible conduit, (innerduct) per fill as shown on plans

(23) Provide suitable pull string in each empty conduit except sleeves and nipples.

(24) Use suitable caps to protect installed conduit against entrance of dirt and moisture.

(25) Ground and bond conduit under provisions of Section 26 0526.

(26) Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.

(27) Set wall mounted boxes at elevations to accommodate mounting heights indicated.
   a. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
   b. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
   c. Align adjacent wall mounted outlet boxes for switches, thermostats, Information Outlets, and similar devices.

(28) Do not install flush mounting box back-to-back in walls; provide minimum 12 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
   a. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
   b. Support boxes independently of conduit.
   c. Use gang box where more than one device is mounted together. Do not use sectional box.
   d. Use gang box with plaster ring for single device outlets.
e. Set floor boxes level.
f. Provide firestopping under provisions of Section 07 8400 to sustain ratings when passing conduits and raceways through fire-rated elements.
g. Paint all conduits and raceways to match.

D. ADJUSTING
(1) Adjust floor boxes flush with finish flooring material.
(2) Adjust flush-mounting outlets to make front flush with finished wall material.
(3) Install knockout closures in unused box openings.
(4) Seal all penetrations per local, state and federal codes.

E. CLEANING
(1) Remove all debris from pullboxes, conduit systems.
(2) Ensure no water or other foreign materials have entered the system; remove completely.
(3) Clean interior of boxes to remove dust, debris, and other material.
(4) Clean exposed surfaces and restore finish.

END OF SECTION
270553 IDENTIFICATION FOR COMMUNICATION SYSTEMS

1. GENERAL

A. SUMMARY

(1) Administration of the telecommunications infrastructure includes documentation of cables, termination hardware, patching and cross-connection facilities, conduits, other cable pathways, Telecommunications Rooms, and other telecommunications spaces. All facilities shall apply and maintain a system for documenting and administering the telecommunications infrastructure.

(2) The owner maintains a campus wide labeling scheme for voice and data outlets and patch panels.

(3) Industry Labeling Standards and Conventions shall be used unless otherwise stated in the bid documents or by the Owner's Representative.

(4) Telecommunications Infrastructure Records must be maintained in a computer spreadsheet, or in a computer database. Paper records are encouraged, but are optional. A cable record is prepared for each backbone cable. The record will show the cable name, and must describe the origin point and destination point of the cable. The cable record will record what services and/or connections are assigned to each cable pair or strand. An equipment record is prepared for services distributed from a certain piece of equipment, such as a router, or a system such as the telephone system PBX.

(5) Installer shall maintain accurate, up-to-date Installation or Construction Drawings. At a minimum, the Installation Drawings shall show pathway locations and routing, configuration of telecommunications spaces including backboard and equipment rack configurations, and wiring details including identifier assignments.

(6) Installer shall provide a complete and accurate set of as-built drawings. The as-built drawings shall record the identifiers for major infrastructure components including; the pathways, spaces, and wiring portions of the infrastructure which may each may have separate drawings if warranted by the complexity of the installation, or the scale of the drawings.
B. RELATED DRAWINGS
   a. T-Series drawings follow the specifications in this Section.
   b. Electrical drawings specify the electrical requirements.
   c. Interior Design drawings specify interior finishes, spatial relationships between items, and specific mounting height.

C. REFERENCES
   (1) Requirements, Codes, and Standards
      a. Design, manufacture, test, and install telecommunications cabling networks per manufacturer’s requirements and in accordance with latest revision of the NFPA-70 (National Electrical Code®), state codes, local codes, requirements of Authorities Having Jurisdiction (AHJ), and the following standards, including the most current revisions, addendums, and any Technical Service Bulletins (TSBs) that may have been released at the time of bid, including:
         b. TIA/EIA-606 – Administration Standard for Commercial Telecommunications Infrastructure

D. SYSTEM DESCRIPTION

E. The Contractor will provide and install identification labeling for the project’s voice and data communications systems, including all components from the TO to the TR and between telecommunications spaces.

2. PRODUCTS

A. GENERAL NOTES
   (1) In this section, certain products are specified by manufacturer and part number to establish a level of quality, performance, and consistency. To substitute other products would defeat this effort to the Owner’s detriment. If no manufacturer or part number is specified for a part, then that part is generic, and the Contractor shall submit for approval a part that provides the performance specified herein.

B. IDENTIFICATION
(1) Labels

a. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969

b. Shall be preprinted or computer printed type. Hand written labels are not acceptable

c. Where insert type labels are used provide clear plastic cover over label

d. Outside plant labels shall be totally waterproof even when submerged

e. Equipment Room Copper, Fiber, and Coax Backbone Cable Labels

f. Equipment Room Copper, Fiber, and Coax Horizontal Cable Labels

g. Work Area Copper, Fiber, and Coax Riser Cable Labels

h. Patch Panel Labels

(2) Label Construction

a. Labels shall be white, manufactured of resilient and flexible vinyl or polyester, die-cut, and have adhesive backing for permanent attachment.

b. Labels for Data Cables

c. Labels for data cables shall be:

i. Self-laminating

ii. Rotatable/repositionable

iii. Of appropriate size to completely encircle the cable and completely overlay the identification tag area

d. Placement of Data Cable Labels

e. Labels shall be placed within view at the termination points, within 3 inches (75 mm) of each end of each:

i. Backbone cable
ii. Horizontal cable

iii. Bonding conductor

f. Labels for Data Cable Bundles

i. Cable bundles shall be identified with non-adhesive thermal-transfer-printable marker plates.

ii. Marker plates shall be attached to cable bundles with nylon cable ties or hook and loop ties.


g. Labels for Cabinets and Equipment

i. Cabinets and equipment shall be identified with thermal-transfer-printed, die-cut, microcellular foam labels with a polyester printable surface and high-tack adhesive.

ii. Each outlet, patch panel, and wiring block shall be identified by a label installed on or in the space provided on the device.

h. Label Sizes for Outlets and Termination Hardware

i. Labels for outlets and termination hardware shall be at least 1-1/4 inches wide and 3/8 inch high.

j. Label Sizes for Other Equipment

k. Labels for the following shall be at least 4 inches wide and 1 inch high:

i. Riser cables

ii. Network equipment

iii. Equipment cabinets and racks

iv. Bonding busbars

v. Consolidation point enclosures
vi. Active hardware and equipment

(3) Warning Tags

a. At each location where the fiber cable is exposed to human intrusion, it shall be marked with warning tags. These tags shall:

i. Be yellow or orange

ii. Bear the warning, “CAUTION FIBER OPTIC CABLE”

iii. Have this text in permanent, black, block characters at least 5 mm high

b. A warning tag shall be permanently affixed to each exposed cable or bundle of cables at intervals of not less than 1.5 m.

c. Any section of exposed cable less than 1.5 m long shall have at least one warning tag affixed to it.

(4) Printing of Labels

a. Printing shall be machine-generated in permanent ink that contrasts the background color.

b. All characters shall be block style.

c. The text shall fill the area of the printable field.

3. EXECUTION

A. IDENTIFICATION

(1) Prior to the installation or termination of cabling, confirm all specific labeling requirements with the Owner or the Owner’s Engineer.

(2) Cables

a. Mark backbone cables at each endpoint and at all intermediate pull points, access points, and junction boxes. Labels shall indicate the origination and destination identifier, the sheath identifier, and the strand or pair range.

b. Horizontal cables shall be marked at each end, on the sheath indicating the TR, patch panel and panel port to
which the cable is wired. Block terminated cable shall be identified with a V in place of the panel ID.

(3) Faceplates, Patch Panels, and Wiring Blocks

a. Mark Fiber Distribution Enclosures (FDEs) with adhesive labels that indicate the range of circuits installed within. Label each port with the origination and destination grid identifier and the individual strand ID.

b. Label patch panels alphabetically, beginning at the top. Individual ports shall come from the factory labeled with a number designation.

c. Label each faceplate to indicate, for each cable that it houses, the TR, patch panel, and panel port to which the cable is wired. Label block-terminated cables with the Telecommunication Room and “V” cable number.

d. Label each wiring block numerically, beginning at the top left of the termination field. Within each block, identify the individual rows alphabetically, beginning at the top left and proceeding sequentially down and to the right. Label each row with the corresponding cable identifier, and label each pair or circuit on each cable.

e. Fit each cable with a self-laminating label, bearing the appropriate cable identifier, that surrounds the outermost jacket. Place the label at each end of the cable, within 3 inches (75 mm) of the end of the sheath.

f. Fit each equipment enclosure with a self-adhesive label bearing its respective identifier, affixed to the top center of the front and rear doors.

g. Fit each FDE with a self-adhesive label, bear its respective identifier in block characters, affixed at the top center of the front and rear faces.

h. Fit each adapter inside enclosures with a label bearing its identifier, affixed directly adjacent to its shortest side. Rotate characters so that their orientation is kept left to right, top to bottom.
i. Label conduits and pathways within 0.5 m (18 inches) of each end, where exposed and accessible. It is recommended that additional labeling be provided every 3 m (10 feet) of exposed length.

j. Fit network equipment with a label, placed in an accessible area on the front and rear, bearing the appropriate identifier, MAC address, and date of installation. The label shall not interfere with the operation of or interface to the unit, nor shall it obscure manufacturer's labels.

END OF SECTION
271116 COMMUNICATIONS CABINETS, RACKS, FRAMES AND ENCLOSURES

1. GENERAL

A. SECTION INCLUDES

   (1) Communication Equipment room termination support hardware, backboards

      a. Racks
      b. Equipment Enclosures

B. RELATED SECTIONS

   (1) Section 27 05 26 Ground & Bonding for Communications Systems
   (2) Section 27 11 23 Communications Cable Management & Ladder Rack

C. SUBMITTALS

   (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   (2) Product Data: Provide manufacturers catalog data for hardware
   (3) Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

D. QUALITY ASSURANCE

   (1) All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where “approved equal” is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

   (2) Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
(3) Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

(4) ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard,

(5) ANSI/TIA-569 Telecommunications Pathways and Spaces,

(6) ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure

(7) ANSI-J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

(8) EIA-310-E, Cabinets, Racks, Panels, and Associated Equipment (most recent version) NFPA 70 National Electric Code

(9) BICSI Telecommunications Distribution Methods Manual

E. WARRANTY

(1) See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

2. PRODUCTS

A. EQUIPMENT ENClosures

   a. Model: BGR-41SA-27LRD.
   b. Type: 19-inch gangable equipment rack.
   c. Compliance:
      i. EIA/TIA 310D.
brackets with Ip value of 1.5.

d. UL Listed: US and Canada.
e. Construction: Fully welded.
f. Weight Capacity: 3,000 pounds UL Listed, 12,000 pounds static.
g. Finish of Structural Elements: Black textured powder coat.
h. Rackrail:
   i. Two pairs of fully adjustable, 11-gauge steel rackrail with tapped 10-32 mounting holes in universal EIA spacing.
   ii. Finish: Black e-coat.
   iii. Rackspaces: Numbered.
i. Rear Door: Solid, keylocked, selectively vented with mounting provisions for 4-1/2” fans.
j. Removable Rear Knockout Panel:
   i. 1/2-inch, 5/8-inch, 1-inch, and 1-1/4-inch electrical knockouts and 1/2” “D” UHF/VHF knockouts on 1-5/16-inch x 7-1/2-inch laser knockout plate installed in top and bottom.
k. Grounding and Bonding Stud: 1/4-20 by 1-inch threaded, installed in top and base, allows installation to conform to NEC.

(2) OPTIONS

a. Front Doors: perforated vented
c. Top Panels: steel, accepts 10-inch fan]
d. Integrated Fan Tops:
   i. Proportional speed, thermostatic fan control.
      1.) Fans: 276 CFM
e. Leveling Feet:
   i. 3/8-inch threaded steel, Heavy Duty adjustable from top or bottom.
f. Removable side panels.
g. Door latch.
h. Rackmount Power Strip
   i. 9 outlet 15A Basic surge

B. RACKS

a. Racks shall be manufactured from aluminum and/or steel extrusion.
b. Each rack will have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack will assemble with nut and bolt hardware.
The base angles will be pre-punched for attachment to the floor.

c. Equipment mounting channels will be punched on the front and rear flange with the EIA-310 Universal Mounting hole pattern.

d. Aluminum Racks will be threaded with 12-24 roll-formed threads and will include 40 each combination pan head, pilot point mounting screws.

e. Steel Racks will have 3/8" square holes and will include 40 each #12-24 x ½” mounting screws and 40 each #12-24 cage nuts.

f. The rack will include assembly and equipment-mounting hardware.

g. The rack will be rated:

h. Two Post Racks: 1,000 lb. (453.6 kg) of equipment

i. Four Post Racks: 2,000 lb. (907.2 kg) of equipment

j. The rack will be UL Listed

k. When assembled with top and bottom angles, equipment-mounting channels will be spaced to allow attachment of 19” EIA rack-mount equipment.

(2) RACK CABLE MANAGEMENT

a. Vertical cable management shall have doors that are lightweight, sturdy, and be available in different sizes to allow flexibility in design.

b. The cable management system shall have a C-Channel bracket that allows for easy access to the cable trough.

c. The vertical cable management system shall allow tool-less installation of Cable Spool.

d. Doors shall come standard with on all cable management and be available in both single and double sided configurations.
C. FREE STANDING TWO POST ALUMINUM RACKS

(1) 45U - 7ft (2134 mm) H x 3in (76 mm) Channel x 19in (482.6 mm) Equipment Rack

(2) Rack is to provide 45 rack-mount spaces in a "7-foot rack" for equipment. Each mounting space will be marked and numbered on the mounting channel.

(3) For the "7-foot rack" the assembled rack will measure 84" (2133.6 mm) high, 20.4" (518 mm) wide and 15" (381 mm) deep. The sides (webs) of the equipment-mounting channels will be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.

(4) Finish shall epoxy-polyester hybrid powder coat in the color as specified below.

(5) Approved Manufacturer: Chatsworth

D. FREE STANDING FOUR POST ALUMINUM RACKS

(1) 45U - 7ft (2134 mm) H x 3in (76 mm) Channel x 19in (482.6 mm) Equipment Rack
(2) Rack is to provide 45 rack-mount spaces in a “7-foot rack” for equipment. Each mounting space will be marked and numbered on the mounting channel.

(3) For the "7-foot rack" the assembled rack will measure 84" (2133.6 mm) high, 20.4" (518 mm) wide and 29" (736.6 mm) deep. The sides (webs) of the equipment-mounting channels will be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.

(4) Finish shall be epoxy-polyester hybrid powder coat in the color as specified below.

(5) APPROVED Manufacturer: Chatsworth

E. VERTICAL CABLE MANAGEMENT FOR RACKS

(1) The vertical cable management kits are installed on the side of a 19-inch or 23-inch (483 or 584 mm) wide industry standard rack.

(2) The door(s) shall be designed to provide a concealed vertical space for organizing patch cables.

(3) Cable spools shall be used to organize longer patch cable lengths.

(4) Cable managers are to be matched to the cable rack. Cable managers are available in 6 inch (152 mm), 8 inch (203 mm), 10 inch (254 mm), and 12 inch (305 mm) widths and in 7 foot (2.1 m), 8 foot (2.4 m), and 9 foot (2.7 m) heights.

(5) Approved Manufacturer: Chatsworth

(6) 12" Double Side, Vertical Cable Management, Black Door

(7) 6" Double Side, Vertical Cable Management, Black Door

F. HORIZONTAL CABLE MANAGEMENT FOR RACKS

(1) The horizontal cable management kits are installed on a 19-inch (483 mm) wide industry standard rack above or below panels to organize patch cables.

(2) The kits shall be available in a single-sided and double-sided configuration, and in a 1U-, 2U-, and 3U-height.
3. EXECUTION

A. RACKS AND CABLE MANAGEMENT

(1) Assemble racks and cable management per manufacturer's instructions. Verify that equipment mounting rails are sized properly for rack-mount equipment before attaching the rack to the floor.

(2) All racks must be attached to the floor in four places using appropriate floor mounting anchors. When placed over a raised floor, threaded rods should pass through the raised floor tile and be secured in the structural floor below.

(3) Racks shall be grounded to the TGB using appropriate hardware provided by the contractor. The ground will meet local code requirements and will be approved by the Authority Having Jurisdiction (AHJ).

(4) In seismic areas, the rack should have additional bracing as required by building codes and the recommendations of a licensed structural engineer.
(5) Ladder rack may be attached to the top of the rack to deliver cables to the rack. The rack should not be drilled to attach ladder rack. Use appropriate hardware from the ladder rack manufacturer.

(6) The equipment load should be evenly distributed and uniform on the rack. Place large and heavy equipment towards the bottom of the rack. Secure all equipment to the rack with equipment mounting screws.

B. CLEANING

(1) Remove all unsightly marks and repair any damaged scratched or disfigured work.

END OF SECTION
1. GENERAL
   A. SECTION INCLUDES
      (1) Copper, fiber termination blocks & panels
   B. RELATED SECTIONS
      (1) Section 27 05 10 Basic Communication Requirements
      (2) Section 27 05 26 Ground & Bonding for Communications Systems
      (3) Section 27 11 23 Communications Cable Management & Ladder Rack
      (4) Section 27 11 16 Communications Cabinets, Racks, Frames & Enclosures
      (5) Section 27 15 43 Communications Faceplates & Connectors
   C. SUBMITTALS
      (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
      (2) Product Data: Provide manufacturers catalog data for hardware.
      (3) Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   D. QUALITY ASSURANCE
      (1) Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.
      (2) Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
      (3) Certify materials and equipment shall be the standard products of the manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer’s latest standard design that has been in satisfactory use for at least 2 years prior to bid opening.
      (4) Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.
   E. DELIVERY, STORAGE, AND PROTECTION
      (1) Deliver components to the site in original manufacturers packaging.
      (2) Store all materials in a secure place that is weather tight dry,
not exposed to UV radiation.

(3) Protect all components from damages by handling, weather and construction operations before, during and after installation.

F. WARRANTY

G. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

2. PRODUCTS

A. MANUFACTURERS

(1) Commscope, Uniprise; www.commscope.com

(2) Corning Cable Systems; www.corning.com

B. PATCH PANELS

(1) Category 6A/Class EA Patch Panels

   a. General specifications: Patch panel shall be constructed of high strength steel with satin chrome finish and designed for wall or 19-inch rack mounting.

   b. Panels shall be available in 24-port and 48-port configurations, with height of 1 Rack Unit (RU) of 44.5 millimeters (1.75 inches) for each group of 24 ports.

   c. Removable rear mounted cable management bar and front and rear identification labels.

   d. Patch panels must be capable of connection to the CommScope Intelligent Patching solution or upgradable to connection to the CommScope Intelligent Patching Solution.

   e. Patch panels shall support 5 meter cables in 3 and 4 connector channels, 3 meter cables in 2 connector channels and cross connect cords down to 1 meter.

   f. Comply with the standards for Category 6A/Class EA patch panels listed in the TIA-568 Series Standards and ISO/IEC 11801.

   g. Approved Manufacturer:

      i. CommScope Uniprise Patch Panels

         1.) CPP-UDDM-SL-1U-24 Uniprise Universal Cat6A Panel 1U 24 Port

         2.) CPP-UDDM-SL-2U-48 Uniprise Universal Cat6A Panel 2U 48 Port
C. FIBER HOUSING
   (1) Corning CCH

D. FIBER CONNECTORS
   (1) Fiber Connectors shall be of the same manufacturer as Optical Fiber Cable
   (2) Type: Factory Terminated LC Pigtail
   (3) Insertion Loss: 0.3 dB average, FOTP-171
   (4) Durability: <= 0.2 dB change, 500 rematings, FOTP-21
   (5) Materials
   (6) Ferrule: Composite or Ceramic
   (7) Housing Composite

E. FIBER COUPLERS-SPLICE HOUSING
   (1) OM-4 Duplex LC
   (2) CCH-CP12-E4-P03SH - CCH Pigtailed Splice Cassette 12 F, LC UPC duplex shuttered,

F. ACCESSORIES
   (1) Fiber: Use all Manufacturer recommended accessories
      a. Breakout Kits
      b. Cable Clamps
      c. Ground Kits
      d. Wrap

3. EXECUTION
   A. INSTALLATION
      (1) Install in accordance with plans and manufacturer’s instructions.
      (2) Leave no gaps or spaces between consecutively mounted panels

   B. TERMINATIONS
      (1) Fiber Optic
         a. Terminate all fiber with appropriate single or multi-mode connector.
         b. Provide 50’ minimum slack fiber at all fiber terminations and splices.
         c. Ground system as required

END OF SECTION
271123  COMMUNICATIONS CABLE MANAGEMENT & LADDER RACK

1. GENERAL
   A. SECTION INCLUDES
      (1) Horizontal & Vertical management & support
      (2) Ladder Rack/Tray
   B. RELATED SECTIONS
      (1) Section 27 05 26 Ground & Bonding for Communications Systems
      (2) Section 27 11 16 Communications Cabinets, Racks, Frames & Enclosures
   C. SUBMITTALS
      (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
      (2) Product Data: Provide manufacturers catalog data for hardware
      (3) Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
   D. QUALITY ASSURANCE
      (1) Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:
         a. ANSI/TIA-568 Series
         b. ANSI/TIA-569 Telecommunications Pathways and Spaces
         c. ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
         d. BICSI Telecommunications Distribution Methods Manual
         e. J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
         f. NFPA 70 National Electric Code
            i. NEMA – VE-1 Metal Cable Tray Systems
      (2) NEMA – VE-2 Metal Cable Tray Installation Guidelines
      (3) Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.
      (4) Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than
three years of documented experience.

(5) Certify materials and equipment shall be the standard products of the manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer’s latest standard design that has been in satisfactory use for at least 2 years prior to bid opening.

(6) Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

E. DELIVERY, STORAGE, AND PROTECTION

(1) Deliver components to the site in original manufacturers packaging.

(2) Store all materials in a secure place that is weather tight dry, and not exposed to UV radiation.

(3) Protect all components from damages by handling, weather and construction operations before, during and after installation.

F. WARRANTY

(1) See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

2. PRODUCTS

A. MANUFACTURERS

(1) Chatsworth Products, Inc.; www.chatsworth.com

(2) Leviton; www.leviton.com

(3) Substitutions: See Section 01 60 00 - Product Requirements.

B. CABLE MANAGEMENT

(1) Horizontal
a. WMPSE- Dual Sided Horizontal Patch Cord Organizers, 1RU, 2" D-Rings
b. WMP1E- Dual Sided Horizontal Patch Cord Organizers, 2RU, 2" D-Rings

(2) Vertical
a. 35521-703 Vertical Front and Rear Cable Management, 6" Channel x 80" Long. Black Hinge Cover
b. 35524-703 Vertical Front and Rear Cable Management, 12" Channel x 80" Long. Black Hinge Cover

(3) Fiber Cable
a. S4DCT-DHC 4x4 Solid Duct w/Hinged Cover Yellow with accessories
(4) Velcro
   a. For management only. Not for supporting cables

C. LADDER RACK / TRAY

(1) Ladder rack/tray shall be manufactured from tubular steel. Stringers (sides) will be made from 3/8” wide by 1-1/2” high tubular steel with .065” wall thickness. Cross members (rungs) will be made from 1” wide by ½” high tubular steel with .065” wall thickness.

(2) Ladder rack/tray cross members will be welded in between stringers on 9” centers. There will be 8” of open space in between each cross member.

(3) Design Make:
   a. CPI Universal UL Cable Runway, UL Cable runway Radius Drops - Black
      i. Width 12”, 18” as shown
      ii. 11275-712
      iii. 11275-718

(4) Horizontal 90° Turns (Cable Runway E-Bend)

(5) Horizontal 90° turns shall be manufactured from 3/8” wide by 1-1/2” high tubular steel with .065” wall thickness.

(6) Stringers (sides) will be formed in a 90° arc. Cross members will be welded in between stringers on approximate 23° increments so that there are 5 cross members per turn. The welded assembly will have an inside radius that will create a smooth horizontal 90° turn.

(7) Design Make:
   a. CPI 10822-712

(8) Ladder Rack/Tray Splices

(9) Splice kits will provide a method of mechanically connecting ladder rack/tray sections and turns together end-to-end or side-to-end to form a continuous pathway for cables.

(10) Design Make:
    a. CPI
       i. Butt Splice - 16301-701
       ii. Junction Splice – 10302-701

(11) Ladder Rack/Tray Accessories

(12) Cable straps used for attaching cable bundles to the ladder rack/tray cross members must be reusable with a hook and
loop-style closure, at least 3/4" wide, and sized for cable bundles that are 2", 3" or 4" in diameter.

(13) Cable retaining posts used to keep cable from falling from the side of the ladder rack/tray shall be manufactured from 1" by ½" tubular steel with .065" wall thickness. Cable retaining posts will be 8" high and will attach to the side stringer of the ladder rack/tray with included hardware. The top of the cable retaining posts will be fitted with a rubberized end cap to protect cables.

(14) End caps used to cover the ends of ladder rack/tray will be manufactured from a black fire-retardant rubberized material. End caps will be sized for 3/8" wide by 1-1/2" high side stingers and will be sold in pairs.

(15) Radius drops or “waterfalls” used to maintain the bend Radius of the cables as they exit or enter the ladder rack/tray will be manufactured from aluminum extrusion. The extrusion will be formed in a 90° arc with a minimum bend radius of 3”. Radius drops will attach to either the side stringer or the cross member of the ladder rack/tray using a clevis pin. Radius drops will include 1-1/2” high cable spools that attach to the top of the radius drop to guide cables.

(16) Auxiliary support brackets used to support cables that should be physically separated from the cables in the ladder rack/tray will be made from 1/8" x 1" steel bar. The bracket will be L-shaped and will attach to the side stringer of the ladder rack/tray. The bracket will hang below the ladder rack/tray a minimum of 4". The bracket support surface will be 4" long. The bracket will be zinc plated with a gold chem. finish.

(17) Design Make:
   a. CPI
      i. Ladder rack end caps -
      ii. Radius Drops - 12100-712
      iii. Channel Rack-To-Runway Mounting Plate With Bracket - 12731-712

D. ACCESSORIES
   (1) Velcro
      a. For management only. Not for supporting cables

3. EXECUTION
   A. INSTALLATION
1. Provide all components of the ladder rack/tray system (ladder rack/tray, turns, splices, supports, and accessories) from a single manufacturer.

2. Provide all components of the Optical Fiber Protective system, (duct, dropouts, bends, sweeps, cover and accessories) to protect exposed fiber in Comm Rooms.

3. Install in accordance with plans and manufacturer’s instructions.

4. Ladder rack/tray shall be supported every 5’ or less in accordance with TIA-569. Ladder rack/tray shall be supported within 2’ of every splice and within 2’ on both/all sides of every intersection. Support ladder rack/tray within 2’ on both sides of every change in elevation. Support ladder rack/tray every 2’ when attached vertically to a wall.

5. Use a radius drop to guide cables wherever cable exits overhead ladder rack/tray to access a rack, cabinet or wall-mounted rack, and cabinet or termination field. Provide a support other conductors that should be physically separated from cables within the ladder rack/tray as defined by local code or the authority having jurisdiction (AHJ).

6. The installer will provide touch-up paint color-matched to the finish on the ladder rack/tray and will correct any minor cosmetic damage (chips, small scratches, etc.) resulting from normal handling during the installation process prior to delivery to the owner. If a component is cosmetically damaged to the extent that correction in the field is obvious against the factory finish, the component will be replaced with a new component finished from the factory. If a component is physically damaged due to mishandling or modification during the installation process, it shall not be used as part of the ladder rack/tray system.

7. **CABLE LADDER**
   a. Install all work plumb and true in alignment and in relation to lines, and grades shown.
   b. Attach ladderway to walls with appropriate ‘L’ bracket
   c. Attach ladderway to racks with appropriate rack to runway mounting plate
   d. Install runway radius drops as needed.
   e. Install ground braids to create a continuous system; ground to MGBB
END OF SECTION
271513 COMMUNICATION COPPER HORIZONTAL CABLING

1. GENERAL

A. SECTION INCLUDES

(1) Provision all labor, materials, and equipment for the complete installation of all Copper Horizontal Cabling applications called for in the Bid Documents.

B. RELATED SECTIONS

(1) Section 270510 Basic Communication Requirements
(2) Section 270526 Ground & Bonding for Communications Systems
(3) Section 271123 Communications Cable Management & Ladder Rack
(4) Section 271116 Communications Cabinets, Racks, Frames, and Enclosures
(5) Section 271619 Communications Termination Blocks & Patch Panels

C. SYSTEM DESCRIPTION

(1) This section includes the minimum requirements for Copper Horizontal Cables.

D. SUBMITTALS

(1) See Section 013000 - Administrative Requirements, for submittal procedures.
(2) Product Data: Provide manufacturers catalog data for hardware
   a. Manufacturers cut sheets, specifications and installation instructions for all products
(3) Project Record Documents: Record actual locations of All outlets, cable pathway, sleeves.
(4) Warranty: Submit manufacturer warranty and ensure that forms have been completed in Vail Unified School District’s name and registered with manufacturer.

E. QUALITY ASSURANCE
(1) All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where “approved equal” is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

(2) Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

F. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

a. ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard

b. ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard

c. ANSI/TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and

d. ANSI/TIA-569 Telecommunications Pathways and Spaces

e. ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure


g. and Bonding Requirements for Telecommunications

h. BICSI – Telecommunications Distribution Methods Manual

i. Components Standards

j. NFPA 70 – National Electric Code

k. ISO/IEC 11801 - Generic Cabling for Customer Premises

l. CENELEC EN-50173 - Generic Cabling Systems
G. DELIVERY, STORAGE, AND PROTECTION

(1) Deliver components to the site in original manufacturers packaging.
(2) Store all materials in a secure place that is weather tight, dry, and not exposed to UV radiation.
(3) Protect all components from damages by handling, weather and construction operations before, during and after installation.

H. WARRANTY

(1) The horizontal communications cabling system installed shall be eligible for coverage by a 25 Year Extended Product and Application Warranty to the end user.
(2) Installer Integrator shall provide labor, materials, and documentation in accordance with Commscope Solutions requirements necessary to ensure that the Owner will be furnished with a Commscope Lifetime Warranty.
(3) The installed structured cabling system shall provide a warranty guaranteeing installed channel performance above the ANSI/TIA 568-C requirements for Cat 6, and/or Cat 6A cabling systems or ISO 11801 requirements for Cass D, Class E, and/or Class Ea.
   a. Standards-compliant channel or permanent link performance tests shall be performed in the field with a Commscope approved certification tester in the appropriate channel or permanent link test configuration.
(4) Necessary documentation for warranty registration shall be provided to the manufacturer by the installer (within 10 days) following 100 percent testing of cables.
   a. Submit test results to Commscope Network Solutions, in the certification tester's original software files.
   b. Installer shall ensure that the warranty registration is properly submitted, with all required documentation within 10 days of project completion.
   c. Contractor Integrator must adhere to the terms and conditions of the respective manufacturer's warranty programs.
(5) Installer shall ensure that the Owner receives the manufacturer issued project warranty certificate within 60 calendar days of warranty registration.

I. Cable Construction (by Type):
(1) Listed CMR cable: Solid copper conductors with high-density polyolefin insulation and an overall low smoke polyvinyl chloride (PVC) jacket to achieve a riser (i.e., non-plenum) rating by applicable NEC requirements.

(2) Listed CMP cable: Solid copper conductors with fluorinated ethylene propylene (FEP) insulation and an overall low smoke PVC jacket to achieve plenum rating by applicable NEC requirements.

(3) LSZH cable: Solid copper conductors with non-halogen high-density polyethylene (HDPE) insulation and a low smoke, zero halogen, compound jacket to achieve a LSZH rating by applicable IEC standards.

(4) LC cable: Solid copper conductors with FEP fluoropolymer insulation and overall FEP fluoropolymer jacket to achieve CMP 50 rating by UL standards.

(5) OSP outdoor cable rated for wet locations: Solid copper conductors with polyethylene insulation, polyolefin fluted center member with flooding compound, and black polyethylene jacket.

(6) Comply with following general physical specifications:
   a. Maximum pulling tension: 110 Newton’s (25 pound-force)
   b. Operating temperature: –20 to 60 degrees C [–4 to 140 degrees F]

2. PRODUCTS
   A. Category 6 Augmented (6A)/Class EA Unshielded Twisted-Pair (UTP) Cable
      (1) All Cables shall be of round construction
      (2) Each cable shall contain 4 color coded pairs
      (3) Cable shall be listed for the environment where it will be installed (Plenum, Riser, LSZH, etc.)
      (4) Approved Manufacturer: CommScope Uniprise
      (5) UN884031004/10 CS44R BLU C6A 4/23 U/UTP RL 1KFT
b. **UN874035104/10** CS44P BLU C6A 4/23 U/UTP RL 1KFT

(6) Category 6A horizontal cabling shall provide the following Margin to the specification when installed in a 4 connector Channel.

<table>
<thead>
<tr>
<th>Electrical Parameter (1-250MHz)</th>
<th>Guaranteed Channel Margins to Amendment 1 to ISO/IEC 11801:2002 &quot;Class EA&quot;</th>
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<tr>
<td>Insertion loss</td>
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<tr>
<td>NEXT</td>
<td>3 dB</td>
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<td>PSNEXT</td>
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<td>Return Loss, PSNEXT, PSACR-F, Avg. PSNEXT, Avg. PSAACR-F</td>
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(7) Category 6A horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

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<tr>
<th>Freq (MHz)</th>
<th>Insertion Loss (dB)</th>
<th>PS NEXT (dB)</th>
<th>Avg. PS NEXT (dB)</th>
<th>PS ACR-F (dB)</th>
<th>AVG. PS AACR-F (dB)</th>
<th>NEXT (dB)</th>
<th>ACR-N (dB)</th>
<th>PS NEXT (dB)</th>
<th>PS ACR-F (dB)</th>
<th>PS ACR-F (dB)</th>
<th>Return Loss (dB)</th>
<th>Delay (ns)</th>
<th>Delay Skew (ns)</th>
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3. **EXECUTION**

A. **PRE-INSTALLATION**
(1) Prior to placing any cable pathways or cable, the Contractor shall survey the site to determine job conditions will not impose any obstructions that would interfere with the safe and satisfactory placement of the cables. The arrangements to remove any obstructions with the Project Manager need to be determined at that time.

(2) Ensure all cable placing personnel understand the handling requirements, minimum bend diameters, and maximum pull tensions.

(3) Swab and clean conduits.

B. INSTALLATION

(1) Install communications horizontal cabling in accordance with manufacturer’s instructions, ANSI/TIA-568-C.0, ANSI/TIA-568-C.1, ANSI/TIA-569-C, BICSI TDMM, and NFPA 70.

(2) To each Information Outlet, supply and install Data Cables, as indicated, from the CER.
   a. To each Information Outlet, supply and install (1), four pair Category 6A-Blue.
   b. To each Wall Phone Outlet, supply and install (1) four pair Category 6A-Blue.
   c. To each Duplex Data, supply and install (2) four pair Category 6A-Blue.
   d. To each Apple TV, supply and install (1) four pair Category 6A-White.
   e. To each CCTV outlet, supply and install (1) four pair Category 6A-Red.
   f. To each WiFi outlet supply and install (1), four pair Category 6A-Yellow.
   g. To each Bell/PA outlet, supply and install (1) four pair Category 6A-Grey.

(3) Where information Outlets are surface mountable, supply, install the proper raceway, and surface mounted box.

(4) Horizontal cabling shall be installed in raceways, cable trays, or other approved support systems and terminated at station locations indicated.

(5) All cable shall be routed parallel and perpendicular to the building.
supporting steel structure

(6) Cabling shall take the form of a “Universal Cabling Plan” where station cables are wired directly, home run fashion, from a distribution point to the appropriate Information Outlet supporting the specified Data capabilities.

(7) Horizontal cables not installed in conduit or wireways shall be properly secured and neat in appearance.

(8) All cabling shall be supported at least 15cm above the drop ceiling.

(9) All cabling shall be supported a minimum of 1.5m O.C. via the means of ‘J’ hooks or other approved method.

(10) All cabling shall be neatly organized using Velcro. NO cinch-type cable ties.

(11) Label each cable ends with computer generated permanent ink permanent label per TIA-606-B.

C. CLEANING

(1) Remove all unsightly marks and repair any damaged scratched or disfigured work

END OF SECTION
271543  COMMUNICATIONS FACEPLATES & CONNECTORS

1. GENERAL

A. RELATED SECTIONS

(1) Section 270500 Basic Communication Requirements
(2) Section 270526 Ground & Bonding for Communications Systems
(3) Section 271123 Communications Cable Management & Ladder Rack
(4) Section 271116 Communications Cabinets, Racks, Frames, and Enclosures
(5) Section 271119 Communications Termination Blocks & Patch Panels

B. SYSTEM DESCRIPTION

(1) This section includes the minimum requirements for Fiber Connectors, Adapters and Adapter Panels.
(2) The performance for the installation shall meet or exceed the requirements of ANSI/TIA-568 and ISO/IEC 11801 and other requirements as noted in this specification for the specified Fiber Type.
(3) The connectors and adapters shall match the fiber type of the cabling
(4) All connectors and adapters shall meet UL 94 V-O

C. SUBMITTALS

(1) See Section 013000 - Administrative Requirements, for submittal procedures.
(2) Product Data: Provide manufacturers catalog data for hardware
(3) Project Record Documents: Record actual locations of All outlets, cable pathway, sleeves.
(4) Warranty: Submit manufacturer warranty and ensure that forms have been completed in City of Tucson's name and registered with manufacturer.

D. QUALITY ASSURANCE

(1) Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.
(2) Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
(3) Certify materials and equipment shall be the standard products of the manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer’s latest standard design that has been in satisfactory use for at least 2 years prior to bid opening.

(4) Installer Qualifications: Company manufacturer certifies specializing in performing the work of this section with minimum 5 years of experience.

E. DELIVERY, STORAGE, AND PROTECTION
   (1) Deliver components to the site in original manufacturers packaging.
   (2) Store all materials in a secure place that is weather tight dry, and not exposed to UV radiation.
   (3) Protect all components from damages by handling, weather and construction operations before, during and after installation.

F. COORDINATION
   (1) Coordinate installation of Jack/Information outlets and connectors with other trades.

2. PRODUCTS
   A. INFORMATION OUTLETS
      (1) USL10G Cat 6A Information Outlet;
         a. Data: Blue
         b. Voice: White
         c. Security: Red
         d. PA: Yellow
      (2) USL10G-SHLD, GY Shielded Cat 6 Connector
         a. AV: Grey
   B. FACEPLATES
      (1) Stainless Steel with ID window
         a. Port count as required

3. EXECUTION
   A. PRE-INSTALLATION
      (1) Clean cable to remove construction materials
B. INSTALLATION
   (1) Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
   (2) Jack/Information outlets and Connectors shall be installed following industry standard practices.
   (3) Horizontal cabling shall be terminated on a Jack/Information outlet which is the same category rating as the Cable.
   (4) Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer’s specifications.
   (5) Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

C. WORKSTATION TERMINATIONS
   (1) Use manufacturers recommend termination tool. Stuffer cap impact not acceptable
   (2) Terminate fiber connectors where appropriate
   (3) Label each cable ends with computer generated permanent ink permanent label per District standard labeling scheme.
   (4) Install appropriate faceplate.
   (5) Label outlet per specification

D. RACK TERMINATIONS
   (1) Terminate differing systems on their own patch panel
   (2) Termination shall occur from the lowest information Outlet number to the highest Information Outlet number.
   (3) Contractor shall take great care to route cabling and ensure clearance for maintenance.

E. CLEANING
   (1) Remove all unsightly marks and repair any damaged scratched or disfigured work

END OF SECTION
END OF DIVISION
DIVISION 28 – ELECTRONIC SURVEILLANCE

282129 VIDEO SURVEILLANCE CAMERAS, REMOTE DEVICES & SENSORS

1. GENERAL
   A. SECTION INCLUDES
      (1) Cameras.
      (2) Switches
      (3) Cable and accessories.
      (4) Licenses
   B. REFERENCES
   C. SYSTEM DESCRIPTION
      (1) Description: Provide video communications between points of surveillance indicated on Drawings and Central recording/distribution system.
   D. SUBMITTALS
      (1) See Section 01 30 00 - Administrative Requirements, for submittal procedures.
      (2) Shop Drawings: Indicate electrical characteristics and connection requirements, including system wiring diagram.
      (3) Product Data: Provide showing electrical characteristics and connection requirements for each component.
      (4) Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
      (5) Project Record Documents: Record actual locations of cameras and routing of cable.
      (6) Operation Data: Instructions for starting and operating system.
      (7) Maintenance Data: Routine trouble shooting procedures.
   E. QUALITY ASSURANCE
      (1) Conform to requirements of NFPA 70.
      (2) Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 50 miles of Project.
(3) Products: Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

2. PRODUCTS

A. COMPONENTS

(1) Manufacturers:
(2) Arecontvision; www.arecontvision.com
(3) Domes/Enclosures
(4) Application: Indoor or Outdoor as environment dictates
(5) Outdoor Domes/Enclosures
a. Operating Temperature: +40º F (+4ºC) to +150ºF (+66ºC)
b. Input Voltage: 12VDC, 24VAC, 110-220VAC
c. Vandal proof IP.v66
d. Pressurized
e. Built-in surge & lightning protection
f. System Components and Supplied Accessories:

(6) Camera enclosure, camera bracket, fan, humidity absorber, thermostat, thermo-dynamic cooling module

B. Indoor Domes/Enclosures
(1) OptiClear polycarbonate 7” dome,
(2) Housing extends maximum 3.5” below ceiling
(3) Fixed mount camera bracket
(4) Plenum rated metal top
(5) System Components and Supplied Accessories:

a. Camera enclosure, camera bracket, fan, humidity absorber, thermostat, thermo-dynamic cooling module

C. Cameras
(1) Application: Indoor or Outdoor as noted
(2) Megapixels: 5MP/12MP as noted
(3) Resolution: no less than 2560(H) x 1920(V) pixels relative.
(4) Remote Zoom/Autofocus
(5) Aspect Ratio: user configurable and not limited to 4:3 or 16:9 aspect ratios.
(6) Light Requirement: Minimum light requirement to produce a color image shall be approximately 0.30 lux (0.03 fc) with a f1.2 lens.
(7) Night mode: less than 0.05 lux (.005 fc) shall be required to produce a black and white image.
(8) Automatic white balance, automatic exposure, gain control, electronic shutter, and backlight compensation.
(9) Memory: at least 64MB of RAM and 4MB of flash memory.
(10) Remote Zoom: Digital
(11) Power: IEEE 802.3af Power-over-Ethernet ready and can also be powered directly using 12-24 VDC or 24 VAC
(12) Authentication: Digital image authentication shall be available and
labeled to verify that images have not been altered, manipulated, or tampered with, in any way.

(13) Progressive scan CMOS imager with a 1/2-inch optical format
(14) Dual encoder MJPEG, H264 compatible
(15) built-in web server and FTP server
(16) HTTPS encryption with IP filtering
(17) IK-10 Impact Resistant
(18) LUX
   i. Color: 0.3 @ f1.4
   ii. B&W: 0.005 @ f1.4
(19) Iris: Auto
(20) Frame Rate: 25/30 per second at highest resolution
(21) Flash upgradeable

(22) Approved Camera:
   a. Arecontvision - AV12276DN-## appropriate lenses and all accessories
   b. Arecontvision – AV5555DN-F-## appropriate lenses and all accessories

D. ACCESSORIES

(1) Licenses:
(2) Provide license & 3 year support for each camera installed. Add licenses to existing Owner contract

E. Main Video Cable: Category 6A for cameras under 90 meters- Multimode fiber for cameras over 90 meters.

3. EXECUTION

A. INSTALLATION

(1) Install in accordance with manufacturer’s instructions.

B. ADJUSTING

(2) Adjust lens to meet lighting conditions. All lenses to maximize depth of field and field of view
(3) Coordinate with owner for coverage of cameras adjust per owners’ requirements
(4) Ensure all cameras communications to central NVR

C. DEMONSTRATION

(1) Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.
282329 VIDEO SURVEILLANCE DIGITAL VIDEO RECORDERS

1. GENERAL

A. SUMMARY

(1) Section includes a device to acquire, record, store, and display video signals from both directly connected analog cameras and IP network video cameras and encoders.

(2) Related Requirements
   a. 28 21 29 – Video Surveillance Cameras Remote Devices and Sensors

B. REFERENCES

(1) Abbreviations
   a. HDD – Hard Disk Drive
   b. IP - Internet Protocol
   c. LDAP – Lightweight Directory Access Protocol
   d. Mbps – Megabits per second
   e. NVR – Network Video Recorder
   f. POS – Point of Sale
   g. PSIM – Physical Security Information Management
   h. VMS - Video Management System

(2) Reference Standards
   a. Institute of Electrical and Electronics Engineers (IEEE) 802.3 standards
   b. FCC – Code of Federal Regulations, Title 47, Part 15
   c. ISO / IEC 14496 – 10 – MPEG-4, Part 10 (H.264)
   d. UL
   e. CE

C. SUBMITTALS

(1) Product Data
   a. Manufacturer’s printed or electronic data sheets
   b. Manufacturer’s installation and operation manuals

D. QUALIFICATIONS
(1) Manufacturer shall be ISO 9001 certified with a minimum of three years’ experience in manufacturing digital storage equipment and associated interfaces.

E. LICENSES

(1) The NVR shall have all 32 IP camera licenses included, with a provision to acquire additional licenses to a total of 64.

F. WARRANTY AND SUPPORT

(1) Manufacturer shall provide a limited three-year warranty and updates for device firmware and client and web software during the warranty period.
   a. An extended support option shall be available.

2. PRODUCTS
   A. EQUIPMENT
      (1) Manufacturer: Exacq Technologies, Inc.
         a. Web: https://www.exacq.com
         b. E-mail: exacqinfo@tycoint.com
      (2) Model: A-Series IPS
      (3) Alternates: None

   B. DESCRIPTION
      (1) The IPS Network Video Recorder (“NVR”) shall be an appliance to acquire, record, store, and display video signals from both directly connected analog cameras and IP network video cameras and encoders.

      (2) The NVR appliance hardware shall have the following characteristics:
         a. Chassis: 4 RU rack-mount
         b. Camera inputs
            i. Analog: N/A
            ii. IP: Up to 64 IP video cameras or encoders
iii. Connectors: BNC

c. Audio Inputs: N/A

d. Storage capacity: 48TB

e. RAID capability: RAID 5

f. Video compression – Analog: MJPEG, H.264

g. Video compression – IP: MJPEG, MPEG-4, H.264, H.265

h. Video outputs: N/A

i. Microphone input: 1 RCA connector

j. Audio outputs: 1 stereo (RCA connectors)

k. Alarms:

   i. Inputs: provision for 8 external TTL

   ii. Outputs: provision for 4 external TTL, 1 external relay

l. Server characteristics:

   i. Operating system: Windows 10 / Windows Server 2012 R2

      1.) Windows: 256 GB SSD

   ii. Monitor outputs: 1 DVI-I + 1 HDMI +1 Display Port (max 2 simultaneous)

   iii. Processor: Gen 4 Intel® Core i7

   iv. Memory: 16GB

   v. Network: 2 x 1000 BASE-T (Gigabit)

   vi. USB 2.0 ports: 6

   vii. USB 3.0 ports: 2

   viii. Optical Drive: included

m. Enclosure

   i. Material: painted steel

   ii. Dimensions (l x w x h):

      1.) 4RU: 28 in x 16.75 in x 7.00 in

n. Electrical

   i. Input voltage: 120/240 VAC auto-sensing

(3) Video Management System (“VMS”)
a. The NVR shall come pre-loaded with Professional VMS server software.

b. The VMS server software shall provide the following features as a minimum:
   i. System
      1.) One server connection per client
      2.) Browser-based viewing of live and stored video
      3.) Auto detection of supported cameras
      4.) Support for fish-eye and panoramic lens cameras
      5.) Client bandwidth throttling
      6.) Soft triggers
      7.) Pre and post alarm recording
      8.) Continuous motion, time or alarm-based recording, configurable per camera
   ii. Live video view
       1.) Multiple monitor view support
       2.) PTZ control and presets
       3.) Digital PTZ control and presets
       4.) Motion and alarm indication
       5.) Event linking on discrete inputs
   iii. Search, playback, export, archive
       1.) Instant replay
       2.) Event search
          iii.) Thumbnail views
          iii.) Timeline views
       3.) Multi-camera playback
       4.) Export options
          iii.) USB storage device
          iii.) .AVI, .MOV, .MP4 or .EXE file
   iv. The NVR shall have the ability to support pre-loaded VMS software providing additional advanced functionality, including the following:
       1.) System
iv.) Server connections – up to 512 via a thick client interface or 16 via web client
iv.) Ability to specify minimum and maximum retention times on a per camera basis
iv.) Time-lapse recording
iv.) Extended storage
iv.) Archiving
iv.) Audit trail
iv.) Custom user groups
iv.) Intelligent search
iv.) E-mail notifications on system health
iv.) Enterprise level camera, server, and user management
iv.) LDAP and active directory support

2.) Live view
iv.) Event linking on video, serial, and health events
iv.) Video wall support
iv.) Event-driven and time-based video switching
iv.) Camera groups
iv.) Multi-streaming
iv.) Event notifications
iv.) Map support, including hierarchical maps
iv.) Two-way audio

3.) Search, playback, export, archive
iv.) Multiple camera export

(4) User Interfaces – The NVR shall support both thick client browser-based and a mobile web client interface.

a. Thick client
i. Client software shall be downloadable at no charge from the NVR Manufacturer’s web site and be fully
compatible with all available features of the VMS server software.

ii. The client software shall be available for Windows, Apple iOS, and Linux operating systems.

b. Mobile web client
   i. A free mobile application shall be available permitting remote view of live and recorded video through the NVR.
   ii. The mobile application shall support PTZ control and the monitoring and activation of alarms and triggers for the mobile device.
   iii. The mobile application shall be available for devices running Apple iOS, Google Android, Microsoft Windows, and Amazon Kindle Fire software.
   iv. The mobile application shall allow simultaneous interaction with multiple NVR devices from the same Manufacturer.
   v. The web service supporting the mobile application shall size the video stream to accommodate both low bandwidth and high bandwidth networks.

C. PERFORMANCE
   (1) Compatibility
      a. Video – The NVR shall be compatible with the following video manufacturers:

   (2) Recording
      a. Video storage rate:
         i. Windows: 300 Mbps

   (3) Display
a. Local client display rate:
   i. Windows HD resolution: 700 frames per second
   ii. Windows Analog resolution: 1800 frames per second
   iii. Linux HD resolution: 900 frames per second
   iv. Linux Analog resolution: 1800 frames per second

D. ENVIRONMENTAL
   (1) Operating temperature: 40 – 95 degrees Fahrenheit (4.5 – 35 degrees C)
   (2) Power/heat load: 120 Watts/400 BTU per hour maximum

E. OPTIONAL EQUIPMENT
   (1) The NVR shall have optional expansion capability for alarm inputs and outputs.

3. EXECUTION

A. INSTALLATION
   (1) Contractor shall comply with all Manufacturer installation guidelines.
   (2) Contractor personnel shall comply with all applicable state and local licensing requirements.
   (3) Contractor shall provide Certified programming to meet the owner’s requirements for a complete operational system
      a. Provide a minimum 40 hours programming time to owner
      b. Onboard all cameras
         Program all camera/recording options to meet owners’ requirements
c. Create all views and install clients on all owner required devices including desktops, mobile and smart devices.

B. STORAGE

(1) Hardware shall be stored in an environment where temperature and humidity are in the range specified by the hardware manufacturer.

C. DEMONSTRATION

(1) Demonstrate system operation and provide a minimum 8 hours of instruction with manufacturer's training personnel.

(2) Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.

END OF SECTION

END OF DIVISION
DIVISION 31 – EARTHWORK

311000 EARTHWORK

1. GENERAL:

   A. SCOPE: This section of the specifications includes furnishing all labor, materials and equipment necessary to complete all site and earthwork as indicated on the drawings and/or as hereinafter specified including but not necessarily limited to the following:

      (1) Project layout and verification
      (2) General protection responsibilities
      (3) Site preparation and rough grading
      (4) Earth excavation, filling and compaction
      (5) Finished grading

   B. Related Sections:

      (1) 015100 – Site Protection
      (2) 312150 - Excavation, Filling and Backfilling
      (3) 312210 - Trenching and Backfilling

   C. Related Documents: Drawings and general provisions of the Contract, including general and supplementary conditions, apply to the work of this section. Other related documents include:

      (1) Pima County / City of Tucson (PC/COT) Standard Specifications for Public Improvements (2003 edition), hereafter referenced as PC/COT SSPI.

   D. Project Layout: Contractor shall employ and pay for the services of a registered surveyor licensed to practice in the State of Arizona to lay out the work and check and verify all elevations, dimensions, etc., prior to starting construction. Any discrepancies in the above shall be immediately reported to the Architect. All grades, lines, levels and benchmarks shall be established by the general Contractor who shall be responsible for same. From time to time, the surveyor shall check the work for proper alignment, location, elevations, etc.
E. General Protection Responsibilities:

(1) Engineering Responsibility: Contractor for this work shall be responsible for all engineering and safety for execution of his work. Provide and install shoring, needles, bracing and wedging to support or protect any excavation, banks, sidewalks, walls and other structures. All shores, needles or braces shall be located so as not to interfere with the construction. Work shall be done in accordance with competent engineering practices and local building codes. Location of cuts, fills, and excavations shall be the responsibility of the Contractor.

(2) Protection of Persons: Protection of all persons shall be provided at all times. The work shall proceed in such manner as to prevent the undue spread of dust and flying particles. Provide all necessary temporary protective barriers and fencing as required.

(3) Preservation and Restoration of Property: The Contractor shall be responsible for the preservation of all public and private property on the surface or underground, along and adjacent to the work, and shall conduct his operation so as to insure the prevention of injury or damage thereto. No land monuments or similar property shall be disturbed or moved until an authorized agent of the Architect has witnessed or otherwise referenced their location. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, or as the consequence of the non-execution thereof on the part of the Contractor, such property shall be restored by the Contractor, at his own expense, to a condition equal to that existing before rebuilding, or otherwise restoring same, or he shall make good such damage or injury in an acceptable manner.

(4) Existing Utilities: The existing utilities service lines and utilities structures, whether shown on the drawings or not, shall be protected and safeguarded from damage during earthwork operations and, if damaged, shall be repaired by the Contractor at his expense.

a. The above provisions are applicable to all or any portion of utilities service lines and utilities structures which project above the original surface or lie beneath the ground surface within any grading area.
(5) Landscape Protection: Contractor shall take all necessary precautions to preserve without damage any trees or landscaping within the property lines, except those specifically designated for removal and disposal. Verify with Architect.

(6) Burning Debris: No materials or debris shall be burned on the premises.

(7) Dynamite and Powder: No dynamite or powder shall be used or brought to the site.

(8) Dust Control: Contractor is responsible for water and equipment required to keep dust to a minimum during grading and excavation.

F. Soils Engineering and Tests:

(1) Qualified Soils Testing agency shall be employed to supervise the placing and compacting of all fill at the site, to take all samples required for tests as required. Testing shall be done by an approved and independent testing laboratory.

(2) Payment of tests and services of testing agency shall be the responsibility of the Owner.

(3) Test reports shall be delivered to the Owner and duplicate copies to the Architect and Engineer.

(4) Contractor's Responsibility: To notify the soils testing agency when filling and compaction are to take place and know that tests are taken.

2. PRODUCTS:

A. Fill and Backfill:

(1) Fill required to backfill walls or to construct building site shall conform to the Structural Drawings.

B. Base Course: An aggregate base course of 4" thickness (compacted thickness) shall be placed under all on-grade concrete slabs, shall consist of sand and gravel as directed by the soils report and shall be compacted to a minimum 95% of the ASTM D698.
3. EXECUTION:

A. Site Preparation:

(1) General: The site, where indicated on the drawings, shall be cleared of all natural obstructions and any other items which will interfere with the construction operations or as designated for removal a minimum of 5’ beyond the perimeter of the new buildings as directed by this specification and the soils report.

(2) Grubbing: All stumps and subsurface roots larger than three inches (3") in diameter and matted roots existing within the area bounded by lines five feet (5’) outside of structure foundations shall be removed. In other areas of construction all stumps and subsurface roots larger than three inches (3") in diameter and all matted roots shall be removed to a depth of 18” below any sub-grade shoulder slope or existing grade.

(3) Strip and remove all existing rubble, debris, vegetation, obviously loose surface soils from the building areas. Any depressions, ditches, trenches, etc. should be cleaned and widened to accommodate compaction equipment.

(4) After any over excavation has been accomplished, the exposed soils should be scarified, moistened, or dried as required, and compacted to a minimum depth of 8 inches. If clay soils are exposed at finished sub-grade in floor slab areas, the clayey soils shall be removed replaced with engineered fill.

(5) Place and compact required fill in 8” maximum horizontal lifts such that specified densities are achieved. All earthwork for the building pad should extend at least 5 feet beyond the perimeter footings.

(6) Separate Topsoil: All topsoil affected by rough grading, and/or excavations shall be stockpiled on site separately and shall not be used for backfill, but shall be conserved as directed by the Architect and utilized for topsoil in rough and final grading as specified herein.

(7) Planting Areas: All foreign matter shall be removed to a depth of at least two feet (2’) below the new finish grade.
(8) Rough Grading: Uniformly smooth grading of all areas covered by the project, including excavated and filled sections and adjacent transition areas shall be accomplished. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified. All ditches shall be finished so as to drain readily.

B. Compaction:

(1) The sub-grade shall be scarified, moistened (or dried, as required), and re-compacted for a minimum depth of 8 inches before placement of fill materials.

(2) Compaction of backfill and fill shall be performed in horizontal lifts not exceeding 8" loose thickness, and shall attain the following specified percent of maximum density at the appropriate optimum moisture content as determined in accordance with ASTM Designation D698.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>% COMPACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site sub-grade soils (reworked)</td>
<td></td>
</tr>
<tr>
<td>and sub-base fill:</td>
<td></td>
</tr>
<tr>
<td>Below footings</td>
<td>95</td>
</tr>
<tr>
<td>Below slabs -on-grade</td>
<td>95</td>
</tr>
<tr>
<td>Below pavement</td>
<td>95</td>
</tr>
<tr>
<td>Imported fill:</td>
<td></td>
</tr>
<tr>
<td>Below footings</td>
<td>95</td>
</tr>
<tr>
<td>Below slabs-on-grade</td>
<td>95</td>
</tr>
<tr>
<td>Below pavement</td>
<td>95</td>
</tr>
</tbody>
</table>

Any soil disturbed during construction should be re-compacted to the percent compaction as specified above.

Soils below paved areas in which moisture contents have been increased above in-situ moistures, shall be compacted to full depth and width of the increased moisture. Compaction shall be in accordance with the above or to the satisfaction of a Geotechnical engineer.
(3) Moisture Content: On-site clayey soils should be compacted at moisture contents near optimum.

(4) Preparation and placement of fill materials: Fill materials shall be thoroughly mixed to a uniform moisture content. Materials shall be placed and compacted in 8” maximum horizontal lifts at a depth compatible with the compaction equipment being used.

C. All excavation of the building site and for footings shall be carried to a depth as shown on the plans.

Bottoms of all footings shall be finished by hand to insure solid bearing free of loose earth. All debris and large stones uncovered shall be removed from the premises. Earth obtained from excavation and not used as fill for other parts of the site shall be removed from the premises, unless directed by the Architect.

(1) Excavation shall comprise and include the satisfactory removal and disposition of all materials excavated regardless of the nature of materials encountered and which shall therefore be understood to include both rock excavation and common excavation when both classes are present. All suitable excavated materials shall be transported to and placed in the fill areas within the limits of the work except as otherwise directed by the Architect.

(2) Where material encountered within the limits of the work is considered unsuitable by the Architect, such material shall be excavated below the grade shown on the drawings as directed, and the excavation shall be re-compacted with suitable material to the compaction required in structural notes. Native soils are considered suitable for use in compacted fills below building areas, if allowed by a Geotechnical Engineer.

(3) Excavation and filling shall be performed in a manner and sequence that will provide drainage at all times.

(4) Excavation shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where the concrete for walls and footings is authorized to be deposited directly against excavated surfaces. Undercutting will not be permitted.
(5) Shoring, including sheet piling shall be installed to protect workmen and the banks, adjacent paving structures and utilities.

D. Fill and Backfill:

(1) Sub-base fill shall be placed in lifts thin enough that at least the minimum recommended density is obtained throughout each lift.

(2) Except for otherwise specified, each layer shall be spread uniformly by the use of a road machine or other approved device and rolled with an approved tamping roller, heavy pneumatic roller, 3-wheeled power roller or by other suitable equipment sufficient to compact as specified.

(3) After completion of foundation footings and walls, and other construction below the elevation of the final grade and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris.

(4) Material for backfilling shall conform with the specification for the "Sub-base Fill" herein before specified.

(5) No backfill to be placed against footings or walls until concrete is thoroughly set. Backfill shall be placed symmetrically to prevent eccentric loading upon or against structures. Backfill, including utility trench backfill, shall be placed in six inch (6") horizontal layers, and compacted to 95% of the maximum density of the optimum moisture content as determined in accordance with ASTM D-698.

(6) All topsoil secured from rough grading and/or excavation operations shall be distributed on the site during finish grading operations as directed by the Architect.

(7) Topsoil: Previously stockpiled shall be used for backfill in planters. Six inch (6") minimum thickness, finishing level with finish grades required, and a surplus shall be used on areas designated for lawns, also finishing level with the finish grades required.

E. Grading:
(1) Existing and finish grades are indicated on the plans. The site where shown on the plans only shall be rough graded with ground surface being cut or filled as required to meet the finished grades shown, leaving no depressions in which water may puddle.

(2) Finish grading around the building shall be reasonably smooth and carried out from the building in a manner to provide uniform drainage way from the building.

(3) Grading required for paved areas shall be done in a manner that the specified thickness of paving will meet the finish grades shown. This area shall be compacted with water and a heavy roller before paving.

(4) Newly graded areas shall be protected from the action of the elements and any settlement or washing that may occur from that or any other cause, prior to acceptance of the work shall be required and grades re-established to the required elevations and slopes.

END OF SECTION
312150 EXCAVATION, FILLING, AND BACKFILLING

1. GENERAL:
   A. Description of Work:
      (1) Work as evident on drawings and specified herein to accomplish the excavation, filling and backfilling, and all operations pertaining thereto for buildings, complete.
   B. Work Excluded
      (1) Site excavation and backfilling for plumbing, heating and electrical work beyond 5 feet from the building is included in Section 312210, Trenching and Backfilling.
   C. Inspections and Tests
      (1) Inspections and Tests: A special inspection shall be conducted to inspect, and test the preparation of excavations, filling, stripping of existing fill, compaction, and soil materials as described in 'Excavation, Soil Materials and Placing And Compaction' herein.
      (2) The Owner shall pay all testing agency charges for these services. Costs of any re-testing required due to improper compaction shall be accomplished by the same laboratory of record and shall be paid for by the Contractor.

2. PRODUCTS
   A. Soil Materials
      (1) Fill material shall consist of suitable material removed from excavated areas and imported borrow material as required. Fill materials shall be free of roots and other organic materials, trash, frozen material, and particles having a dimension greater than 6". Imported fill shall be compatible with approved on site materials. Materials shall be in conformance with the Structural Notes.
      (2) Base course shall conform to the Structural Notes.

3. EXECUTION
   A. Excavation
      (1) Perform all excavations as indicated on the drawings or as required for a complete installation. All foundations shall bear on materials and at minimum depths as indicated in the Structural Notes.
(2) The subgrade within the building pad shall be prepared as indicated in the Structural Notes.

(3) Bottom of all excavations shall be level and true. If by error, portions of the excavations are extended too deep, only concrete will be permitted for refill material. No compensation will be allowed for such material.

(4) All foundation excavations shall be reviewed and accepted by the Structural Engineer before foundation reinforcing and concrete is placed. Architect shall be given at least 24 hours notice before any concrete is placed.

(5) Where suitable supporting soils are encountered at different elevations than those indicated, the Architect and Structural Engineer may direct in writing that the excavations be carried to elevations above or below those indicated. An extra or credit, as the case may warrant, shall be based on a unit price for such excavation and concrete work.

(6) Grading in vicinity of structure shall be controlled to prevent surface water from running into excavated areas or across the building pad. The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water entering the excavation or other parts of the work. If water enters excavations after having been completed to establish bearing levels, additional excavation may be required to a depth exposing dry, firm bearing soils as determined by the Structural Engineer. The excavation shall be filled to original bearing levels with concrete as specified unless otherwise approved by the Structural Engineer. No foundations or floors shall be constructed on disturbed soils or in water.

(7) Where necessary, excavations shall be properly sheeted and braced to furnish safe and acceptable working conditions. The bracing shall be so arranged as not to place any stress on portions of the completed work, without special written approval of the Architect.

(8) All excess materials from excavations shall be disposed of by the Contractor off the building site.

B. Placing and Compaction

(1) Each lift shall be uniformly compacted to not less than the percentage of the maximum density specified below before another lift is placed. Minimum compaction requirements are indicated in
the Structural Notes.

(2) Where backfill is required on both sides of construction, keep backfill at approximately the same elevation on both sides.

(3) Backfill around all building foundation walls and footings shall be placed and compacted at near optimum moisture content, but shall not be saturated or at a moisture content that results in pumping. In no case shall backfill be water-settled. Non-structural concrete is acceptable for use as back fill (see Section 033000).

(4) Grade to finished elevations as shown on Drawings, or as necessary to provide positive drainage away from the building as approved by Architect. Finish grading within 20 feet of building shall be hand-raked for "fine" finish. Contractor shall coordinate and verify elevations required in landscaped areas, paving, etc.

C. Base Course

(1) Under all interior concrete floors on grade and under all exterior concrete slabs on grade, place a minimum 4 inch thick layer of base course. This material shall not be placed until all work of other trades which passes through or under this work has been properly placed and approved and not until foundations are completed and surface receiving this material is finished as specified. Base course shall be compacted in accordance with the Structural Notes.
313116 TERMITE TREATMENT

1. GENERAL:
   A. Treat all areas under building and footings to form an impermeable barrier and as required to provide warranty.
   
   B. Warranty:
      
      (1) New Structures: Furnish Owner with Certificate of Performance from approved company insuring Owner against damage from termites for five (5) years.
      
   C. All chemicals shall meet all EPA regulations.
   D. Submit information on proposed chemicals.

2. PRODUCTS:
   A. The Contractor shall propose the termiticide to be utilized.

3. EXECUTION:
   A. Apply solution along the inside of foundation walls, both sides of interior partitions and expansion joints and around all plumbing and other utilities that penetrate the slab at a rate of two (2) gallons per five (5) linear feet or as required by manufacturer.
   
   B. Apply in strict accordance with all manufacturer's labeled directions and Federal regulations.

   END OF SECTION

   END OF DIVISION
312210 TRENCHING AND BACKFILLING

1. GENERAL:

   A. Related Documents:

      (1) Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work in this section.

   B. Description of Work:

      (1) Work as evident on drawings and specified herein or required to accomplish the designated excavation, trenching and backfilling for site utilities systems, to the points of connection with the building utilities 5 feet outside the building.

2. PRODUCTS:

   A. Fill Material:

      (1) See Section 311000 Earthwork.

3. EXECUTION:

   A. Excavation:

      (1) General: All excavation of every description of whatever substances encountered shall be performed to the depths indicated or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and wasted as indicated or as directed. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. All trenching must be shored and/or otherwise protected as required to meet all local and OSHA Safety Standards.

      (2) Trench Excavation: Trenches shall be of the necessary width for proper laying of pipe. The banks of pipe trenches shall be as nearly vertical as practicable. Care shall be taken not to over-excavate. The bottom of the trenches shall be accurately graded. Clean coarse sand, well graded gravel or well graded crushed rock
must be used as trench bedding. The trench must be filled with this material to the springline of the pipe, placed in 6" maximum lifts and compacted to 95% maximum density - ASTM D-1557. The remainder of the trench shall be backfilled with specific backfill material. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 8 inches on either side of the pipe. The width of the trench above that level shall be as wide as necessary for sheeting and bracing and the proper performance of the work.

B. Removal of Utility Lines:

(1) When utility lines that are to be removed are encountered within the area of operations, the Contracting Officer's Representative shall be notified in ample time for the necessary measures to be taken to prevent interruption of the service.

C. Backfilling:

(1) The trenches shall not be backfilled until all required pressure tests are performed and until the utilities systems as installed conform to the requirements specified in the several sections covering the installation of the various utilities. Where, in the opinion of the Architect, damage is likely to result from withdrawing sheeting, the sheeting shall be left in place and the contract price will be adjusted accordingly. Except as otherwise specified for special conditions of overdepths, trenches improperly backfilled shall be reopened to the depth required for proper compaction, then refilled and compacted as specified, or the condition shall be otherwise corrected as approved.

(2) The surface shall be restored to its original condition as near as practicable and as hereinafter specified. Pavement, base course, and compacted subgrade disturbed by trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent compacted subgrade, base course, and pavement for a minimum distance of 12 inches on each side of the trench.

(3) Lower Portion of Trench: Backfill material shall be deposited in 6-inch-maximum-thickness layers and compacted with suitable tampers to density of the adjacent soil or graded as hereinafter specified until there is a cover of not less than 2 feet over sewers and 1 foot over other utility lines. The backfill material in this portion of the trench shall consist of a selected material at a moisture content that will facilitate compaction, free from stones.
larger than 3 inches in any dimension and hard clods and frozen conglomerates larger than 3 inches in any dimension, except that where the pipe is coated or wrapped for protection against corrosion the backfill material shall be free from stones larger than 1 inch in any dimension. If any portion of the cover in the lower portion of the trench is in the depth of special compaction and materials requirements under pavement the special requirements shall control. Special care shall be taken not to damage the coating or wrapping of pipes.

(4) Remainder of Trench: Except for special materials for pavements, the remainder of the trench shall be backfilled with material that is free of stones larger than 3 inches or 1/2 the layered thickness, whichever is smaller, in any dimension. Backfill material shall be deposited in layers not exceeding the thickness specified, and each layer shall be compacted to the minimum density specified, and each layer shall be compacted to the minimum density specified as applicable to the particular areas (except that in areas other than under parking areas, and other paved areas subject to vehicular movement, settling of granular, noncohesive material with water will be permitted). Degree of compaction shall be as follows, expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D-698.

a. Under Pavements: Six-inch layers, 95 percent maximum density up to the elevations at which the requirements for pavement subgrade materials and compaction control.

b. Under Sidewalks: Six-inch layers, 95 percent maximum density.

c. Under Other Areas: Six-inch layers, 90 percent maximum density.

(5) Testing: All trench backfill material shall be tested as indicated in Division 1.

END OF SECTION